Financial Frictions and New Exporter Dynamics: Online Appendix

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Contents

1 Robustness

In this section we investigate the robustness of our finding that the sunk cost model cannot match the new exporter dynamics observed in the data. We consider four extensions of our baseline sunk cost model: (1) a sunk cost model with shocks to entry and continuation costs, (2) a sunk cost model with foreign demand shocks, (3) a sunk cost model with shocks to trade costs, and (4) a sunk cost model with labor adjustment costs. We analyze each of these extensions in two steps. First, we provide intuition for how a given extension affects export entry and exit decisions as well as the new exporter dynamics. Second, we calibrate each extension and provide numerical results that support our intuitive argument.

Each of these extensions adds an additional state variable to the entrepreneurs' problem, raising the total number of state variables to four. To simplify the problem we assume that entrepreneurs are risk neutral, $\gamma = 0$, implying that assets play no role in the entrepreneurs' problem and hence can be dropped from the list of states. This significantly decreases the computation time needed to solve the model but has little effect on the results.[1]

We calibrate these extensions following the strategy outlined in the Calibration section of the paper (section 5.1). Each extension adds a new parameter, so we introduce new target moments as needed. See the discussion in each extension below for further details.

The rest of this section is organized as follows. We start by considering stochastic costs of exporting (subsection 1.1); then we consider foreign demand shocks and shocks to iceberg costs of exporting (subsection 1.2 and subsection 1.3, respectively). Finally, in subsection 1.4 we analyze the sunk cost model with labor adjustment costs.

1.1 Shocks to export costs

1.1.1 Specification

To introduce stochastic costs of exporting we follow Alessandria and Choi, 2014 and assume that in order to start exporting firms have to pay entry costs equal to $(S + F)e^{\nu}$ while continuing exporters have to pay Fe^{ν} each period. Here, ν is an i.i.d. shock to export costs and is distributed according to $N(-\sigma_{\nu}^2/2, \sigma_{\nu}^2)$.[2] Thus, at any point in time, firms are heterogeneous in terms of the entry and continuation costs that they face. Since ν leads to heterogeneity in export costs among firms we assume that there is no permanent difference between firms in terms of their entry and continuation costs of exporting, that is F and S are the same across all firms.[3]

Under risk-neutrality, without assets, the dynamic problem of an entrepreneur can be

[1] Imposing risk-neutrality assumes away the consumption smoothing motive from the model. In the model without financial frictions this has negligible effects on the results.

[2] The mean of the distribution is normalized such that $E\left[e^{\nu}\right] = 1$.

[3] Recall that in the benchmark sunk cost model there were permanent differences across firms in terms of S and F. This heterogeneity in costs was needed for the model to match the size distribution of exporters. In this extension we explore a different source of heterogeneity, namely i.i.d. shocks to export entry and continuation costs.

written as:

$$v(z,e,\nu) = \max_{e'} \pi(z,e,e',\nu) + \beta \mathbb{E}_{z,\nu}\left[v(z',e',\nu')\right]$$

where the firm chooses its current export status, e', given its current productivity, z, its past export status, e, and the value of the shock to export costs, ν. $\pi(z,e,e',\nu)$ is the profit function that is defined analogously to the profit function in the benchmark model. Finally, the expectation is taken over the future values of shocks to productivity and shocks to entry and continuation costs.

1.1.2 Intuition

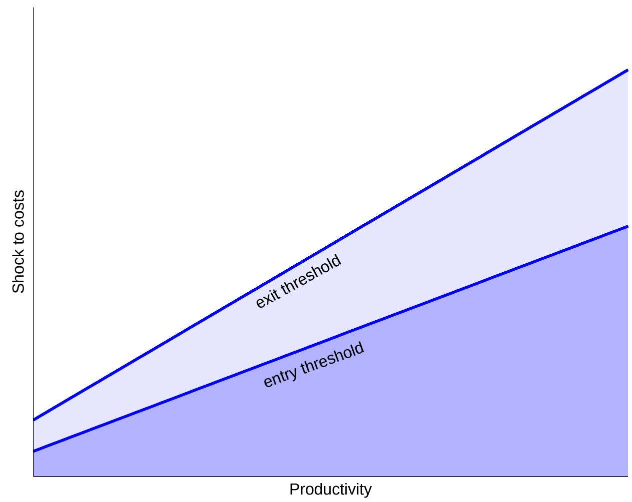
The main difference with our benchmark model is that export entry and exit decisions are now driven by both productivity and export cost shocks. A lower level of export costs is associated with lower productivity thresholds for entering and exiting the export market. As the level of export costs increases these two thresholds also increase. Intuitively, when the entry or continuation costs are lower, sales needed to recoup the costs of exporting are also lower and hence firms with lower productivity find it optimal to export. Figure 1 depicts these thresholds.

It is important to note that in order to simultaneously match the export exit and entry rates, a sunk cost model with stochastic fixed costs requires large sunk costs of exporting. This is because, with an additional source of shocks and holding everything else constant, export exit and entry rates will increase as firms find themselves in a different situation once a shock hits. Since sunk costs were already high in our benchmark sunk cost model, they are expected to be even larger in this extension, so that entry and exit rates are reduced to match their target moments. This observation is the key for understanding the behavior of the export exit rate over time for cohorts of new exporters. Keeping the above remark in mind, we now explain how introducing shocks to export costs affects the new exporter dynamics.

Exports Growth. Conditional on exporting, shocks to export costs have no effect on the firm's optimal scale, which is driven by mean-reverting productivity shocks. As a result, as long as exporters have, on average, a productivity higher that the mean productivity, the export sales of new exporters will decrease over time. Thus, adding shocks to exporting does not improve the fit of the sunk cost model along this dimension.

Export Intensity. In the model, export intensity is determined by the magnitude of the iceberg cost, τ, and the relative characteristics of the domestic and the foreign markets (PQ, P^*Q^*). Therefore, export intensity is independent of shocks to fixed and sunk costs of exporting and, as in our benchmark sunk cost model, export intensity is constant over the export spell. It follows that introducing stochastic entry and continuation costs does not improve the fit of the sunk cost model along this dimension.

Figure 1: Decision rules with shocks to export costs



Notes: The dark area corresponds to combinations of (ν, z) such that firms find it optimal to export (regardless of their past export status). The lighter area corresponds to the realizations of (ν, z) such that firms find it optimal to export only if they exported in the previous period.

Export Exit Rate. Firms enter when their productivity is high and their entry costs are low. The next period their productivity tends to decrease on average (due to mean reversion of productivity shocks) while their fixed costs increase on average (due to the i.i.d. nature of ν). To the extent that sunk costs are large, the new entrants are far from the exit threshold and, thus, these changes result in a small initial exit rate. However, over time, as the productivity revert to its mean level, firms are driven closer to the exit threshold. Moreover, for low levels of productivity, it is optimal to export only for small continuation costs of exporting, Fe^{ν}. When the sunk cost is large, these two forces result in an increasing export exit rate. Therefore, the sunk cost model with stochastic entry and continuation costs of export generates an increasing exit rate.[4]

1.1.3 Quantitative results

We now show that the above intuition is supported quantitatively. In particular, we calibrate the model using a similar strategy as in the case of our benchmark model with two modifications. First, instead of calibrating β we fix it at the value estimated using our benchmark sunk cost model.[5] Second, there are now only idiosyncratic rather than permanent differences in entry and continuation costs, so we have one less parameter to calibrate (instead of

[4] Above we argued why we should expect high sunk costs in this extension of our benchmark sunk cost model.

[5] Since there are no assets in the model we cannot choose β to match external finance over sales ratio. More importantly, the results are robust to choosing alternative values of the discount rate

choosing the share of firms with low export costs and the value of the costs paid by these firms, we need to calibrate the standard deviation of export shocks, σ_ν). To keep the number of parameters and moments the same we choose to drop the share of small exporters from our target moments.

Table 1: Calibration with shocks to entry and continuation costs

γ	0
σ	5
β	0.98
ρ	0.74
τ	1.52
F	1.29
S	13.44
σ_ε	0.20
σ_ν	0.53

Table 1 reports the parameters used to calibrate this extension. We divide parameters into three groups. The first group of the parameters is set to the same values as in the benchmark sunk cost model. The second group of parameters consists of parameters that are also present in the benchmark sunk cost model. We keep the same target moments to match these parameters. Finally, the third group of parameters (in this case only σ_ν) is the set of parameters that were not present in the benchmark sunk cost model. Here, σ_ν helps to match the share of exporters in the third quartile of the size distribution.

Table 2 reports the fit of the model while Table 3 reports the implied new exporter dynamics. While the model is able to match all the target moments, it fails to match the export dynamics observed in the data: the growth of export sales is negative, export exit rate is increasing and export intensity is constant over time. Thus, we conclude that extending our benchmark model by introducing stochastic shocks to entry and continuation costs does not affect the conclusions reached in the paper.

1.2 Foreign demand shocks

1.2.1 Specification

To model stochastic foreign demand shocks we assume that foreign demand is given by $q^* = \left(\frac{p^*}{P^*}\right)^{-\sigma} Q^* e^{\nu}$, where e^{ν} is the foreign demand shock. Here, ν is an i.i.d. shock to the

Table 2: Target moments with shocks to entry and continuation costs

Target Moments	Data	Sunk costs
Export entry rate	0.03	0.03
Export exit rate	0.11	0.11
Median exports/sales	0.16	0.16
Median exporter size premium	4.81	4.72
Share of large exporters	0.24	0.25
Share of very large exporters	0.66	0.67

Notes: "Large exporters" are exporters in the 3th quartile of the size distribution, ranked by total sales. "Very large exporters" are exporters in the top quartile of the total sales distribution. See section 5.1 in the paper for a detailed description of each target moment.

Table 3: New exporter dynamics with shocks to entry and continuation costs

Years as an exporter	Export Growth	Export Exit Rate	Export Intensity
1		0.03	0.16
2	-0.30	0.07	0.16
3	-0.25	0.10	0.16
4	-0.19	0.11	0.16

demand for exports and is distributed according to $N(-\sigma_\nu^2/2, \sigma_\nu^2)$.[6] In this specification, each firm faces a stochastic and idiosyncratic foreign demand for its varieties, where this demand is driven by i.i.d shocks.

Under risk neutrality, and without assets, the dynamic problem of an entrepreneur can be written as:

$$v(z, e, \nu) = \max_{e'} \pi(z, e, e', \nu) + \beta \mathbb{E}_{z,\nu} \left[v(z', e', \nu') \right]$$

where the firm chooses its current export status, e', given its current productivity, z, its past export status, e, and the value of the foreign demand shock, ν. $\pi(z, e, e', \nu)$ is the profit function that is defined analogously to the profit function in the benchmark model. Finally, the expectation is taken over the future values of shocks to productivity and foreign demand.

As in the benchmark sunk costs model we assume that there are permanent differences across firms in terms of their export entry and continuation costs. That is, in the model,

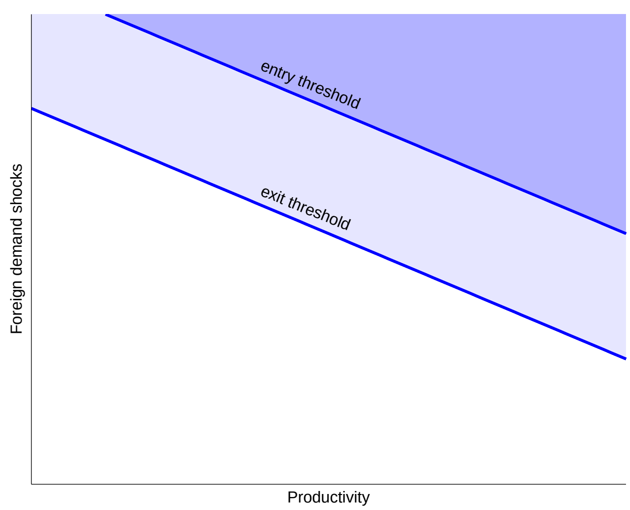
[6] The mean of the distribution is normalized such that $E\left[e^\nu\right] = 1$.

a fraction η of firms have low entry and continuation costs (given by $(S + F)\kappa$ and $F\kappa$, respectively), while the remaining fractuib $1 - \eta$ of firms have high entry and continuation costs (given by $S + F$ and F, respectively).

1.2.2 Intuition

In the model with foreign demand shocks, firms' export entry and exit decisions are driven by both productivity shocks and demand shocks. The productivity thresholds for entering and exiting the export market are now decreasing functions of the foreign demand shock, since a larger demand shock lowers the productivity level above which exporting is profitable. As before, the presence of the sunk cost S implies that the entry threshold lies always above the exit threshold. Figure 2 depicts the combinations of (z,ν) for which firms choose to export.

Figure 2: Decision rules with shocks to export costs



Notes: The dark area corresponds to combinations of (ν, z) such that firms find it optimal to export (regardless of their past export status). The lighter area corresponds to the realizations of (ν, z) such that firms find it optimal to export only if they exported in the previous period.

It is important to note that, similarly to the case of stochastic costs of export, the model will require high sunk costs in order to match the export exit and entry rates.[7] Below, we use this observation to explain why a calibrated version of our model cannot deliver the observed new exporter dynamics.

Exports Growth. Firms that just entered the foreign market have on average high productivity and face high foreign demand. The next period both their productivity and the foreign demand for their varieties will be lower (due to mean reversion of productivity process and

[7] See subsubsection 1.1.2 for the argument.

the i.i.d. nature of foreign demand shocks). However, due to the presence of the sunk costs, most of these firms are unlikely to exit after the first exporting period and, thus, the export growth between the first and second period will be negative.

What happens afterwards depends on the calibration. On the one hand, new exporters' productivity keeps declining suggesting further negative export growth. On the other hand, firms that survive are those that receive high demand shocks suggesting a positive export growth. To the extent that sunk costs are high, the effect of a declining productivity will dominate.[8] Since the model with stochastic foreign demand shocks requires large sunk costs in order to match export entry and exit rates, one should expect that exports growth will be negative, just as in the case without demand shocks.

Export Intensity. A new cohort of exporters will start on average with high demand shocks (higher than the average demand shock among exporters), which implies that these firms will have higher than average export intensity. The presence of sunk costs implies that most of these new exporters will find it optimal to export in the next period despite their foreign demand shock taking on average much lower value. Hence, the export intensity will decline between the first and second periods. What happens afterwards depends, again, on the calibration, but to the extent that the sunk costs are large, the export intensity will stay approximately constant (firms will choose to export for most likely realizations of foreign demand shocks). Over time, as the firms in the cohort get closer to the exit threshold, only firms with high demand shocks will continue to export and, eventually, the median export intensity will increase. Hence, we would expect that export intensity will follow a U-pattern with the length of the period during which it is approximately flat depending on the size of the sunk costs.

Export Exit Rate. The intuition behind the effect of foreign demand shocks on the export exit rate is very similar to the case of shocks to export entry and continuation costs. Firms enter when they receive high productivity and foreign demand shocks. The next period both their productivity and foreign demand decrease on average. However, to the extent that sunk costs are large, new entrants are far from the exit threshold and, thus, these changes result in a small initial exit rate. Over time, as their productivity reverts to its mean level, firms are driven closer to the exit threshold which increases the exit rate. Moreover, for low levels of productivity it is optimal to export only for for high foreign demand shocks, which further reinforces this mechanism. Therefore, we should expect that the sunk cost model with foreign demand shocks generates an increasing exit rate.

[8] This is because firms will continue to export for a majority of values of the demand and productivity shocks, despite the latter progressively getting lower.

1.2.3 Quantitative results

Above we argued that introducing demand shocks in a sunk cost model will fail to match the new exporter dynamics. In this section we provide support for this claim with quantitative results. Again, we calibrate our model using a similar approach as in the case of benchmark sunk cost model.

Table 4: Calibration with demand shocks

γ	0
σ	5
β	0.98
ρ	0.81
τ	1.44
σ_ε	0.16
F	1.50
S	6.88
κ	0.28
η	0.05
σ_ν	0.91

Table 4 reports the parameters used to calibrate this model extension. Again, we divide parameters into three groups. The first group of the parameters is set to the same values as in the benchmark sunk cost model. The second group of parameters consists of parameters that are also present in the benchmark sunk cost model and we use similar target moments to calibrate them. Finally, the third group of parameters (in this case only σ_ν) is the set of parameters that were not present in the benchmark sunk cost model. Here, we add an additional moment to help pinpointing σ_ν, the ratio of the standard deviation of foreign sales to the standard deviation of domestic sales.[9]

Table 5 reports the fit of the model while Table 6 reports the implied new exporter dynamics. We see that the model can match the aggregate target moments very well. However, it fails to match the export dynamics observed in the data: the growth of export sales is negative, export exit rate is increasing and export intensity follows a U-shaped pattern. These results support the intuitive argument provided in subsubsection 1.2.2 that foreign demand shocks are unable to reconcile the sunk costs model with the data.

[9] This is a natural target moment since a higher σ_ν translates into an increase in the dispersion of foreign sales without affecting the dispersion of domestic sales.

Table 5: Target moments with demand shocks

Target Moments	Data	Sunk costs
Export entry rate	0.03	0.03
Export exit rate	0.11	0.11
Median exports/sales	0.16	0.16
Median exporter size premium	4.81	4.75
Share of small exporters	0.03	0.03
Share of large exporters	0.24	0.22
Share of very large exporters	0.66	0.70
sd(foreign sales)/sd(domestic sales)	1.44	1.44

Notes: "Small exporters" are exporters in the 1st quartile of the size distribution, ranked by total sales. "Large exporters" are exporters in the 3th quartile of the total sales distribution. "Very large exporters" are exporters in the top quartile of the total sales distribution. See section 5.1 in the paper for a detailed description of each target moment.

Table 6: New exporter dynamics with demand shocks

Years as an exporter	Export Growth	Export Exit Rate	Export Intensity
1		0.06	0.31
2	-0.71	0.11	0.14
3	-0.08	0.13	0.14
4	-0.12	0.14	0.14

1.3 Shocks to iceberg costs of exporting

1.3.1 Specification

We now introduce shocks to variable export costs into our model. Our modeling choice follows closely Alessandria and Choi, 2014. In this extension, exporters are heterogenous with respect to the iceberg cost they face, which take values from the set $\{\tau_1, \tau_2, ..., \tau_N\}$ where $\tau_1 > \tau_2 > ... > \tau_N$. We assume that the iceberg costs are decreasing in a stochastic manner. More precisely, each new exporter enters with an initially high iceberg cost, τ_1, and each period, conditional on exporting, it faces probability p that its iceberg cost falls from τ_i to τ_{i+1}. Once the iceberg cost reaches its lowest value τ_N, it stays at this level as along as the firm exports. If a firm stops exporting and then reenters the foreign market, it has to pay again the highest iceberg cost, τ_1.[10] The dynamics of the iceberg costs are captured by the transition probability matrix below:

$$\begin{bmatrix} 1-p & p & 0 & \cdots & 0 & 0 & 0 \\ 0 & 1-p & p & \cdots & 0 & 0 & 0 \\ 0 & 0 & 1-p & \cdots & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & \cdots & 1-p & p & 0 \\ 0 & 0 & 0 & \cdots & 0 & 1-p & p \\ 0 & 0 & 0 & \cdots & 0 & 0 & 1 \end{bmatrix}$$

Transition Matrix

Under risk neutrality, and without assets, the dynamic problem of an entrepreneur can be written as:

$$v(z,e,\tau) = \max_{e'} \pi(z,e,e',\tau) + \beta \mathbb{E}_{z,\tau'} \left[v(z',e',\tau') \right]$$

where the firm chooses its current export status, e', given its current productivity, z, its past export status, e, and the variable cost faced currently by the firm, τ. $\pi(z,e,e',\tau)$ is the profit function that is defined analogously to the profit function in the benchmark model. Finally, the expectation is taken over the future values of the productivity shock and the iceberg cost.

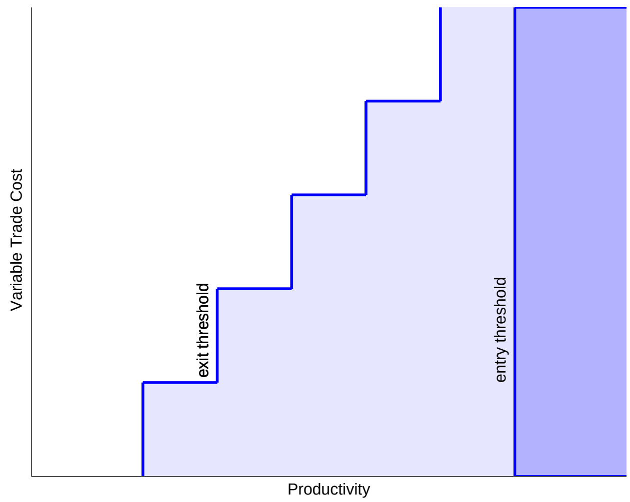
As in the benchmark sunk cost model we assume that there are permanent differences across firms in terms of their export entry and continuation costs. That is, in the model, a fraction η of firms have low entry and continuation costs (given by $(S+F)\kappa$ and $F\kappa$, respectively), while the remaining fraction $1-\eta$ of firms have high entry and continuation costs (given by $S+F$ and F, respectively).

1.3.2 Intuition

In the model with iceberg trade cost shocks, the decision to enter the foreign market is driven only by the productivity shocks, z, while the exit decision depends on both productivity shocks, z, and shocks to variable trade cost τ. In this specification, firms enter the foreign market when they receive high productivity shocks. Once a firm starts exporting, it faces a probability p that its variable cost of exporting will decrease. Since lower τ implies higher profits from exporting, firms that have low variable costs of exporting are willing to export for a wider range of productivity values. Thus, the productivity exit threshold is decreasing in τ. Figure 3 depicts the export entry and exit thresholds as a function of τ and z.

[10] Assuming stochastically decreasing iceberg costs, as opposed to i.i.d shocks to variable costs, gives this extension the highest chance to replicate new exporter dynamics; see Alessandria and Choi, 2014.

Figure 3: Decision rules with shocks to export costs



Notes: The dark area corresponds to combinations of (τ_i, z) such that firms find it optimal to export (regardless of their past export status). The lighter area corresponds to the realizations of (τ_i, z) such that firms find it optimal to export only if they exported in the previous period.

A key feature of this model is that all new exporters face initially the highest possible trade cost, but as they continue exporting their trade costs decrease in a stochastic manner. Therefore, similarly to sunk costs, iceberg trade cost shocks induce persistence in firms' export decision. The longer a firm exports, the lower is its trade cost on average and the stronger are its incentives to keep exporting, everything else equal. Thus, with stochastically decreasing iceberg costs, the sunk cost model could, in principle, match both the export entry and exit rates, and the size distribution of exporters, with relatively low sunk costs. This is important since high sunk costs were one of the key reasons why the other extensions failed to deliver the new exporter dynamics observed in the data.

Exports Growth. To understand the dynamics of export sales, note that new exporters' foreign sales are initially low, since they face high variable costs of exporting. As they continue exporting, however, their variable costs tend to fall inducing them to increase their foreign sales. If this was the only force driving foreign sales, export sales would be increasing over time. However, foreign sales are also driven by the productivity shocks. New exporters have high productivity shocks but as they continue exporting their productivity tend to fall due to the mean reversion inherent in the productivity process. This force in turn points towards decreasing foreign sales. Whether the model with iceberg trade cost shocks delivers increasing export volumes will depend on the strength of the mean reversion, which is governed by ρ, and the rate at which the variable costs of export decrease, governed by p.

Export Intensity. It is easy to see that stochastically decreasing variable trade costs, τ, will result in increasing export intensity. This is because variable trade costs determine the optimal export intensity, and low variable trade costs are associated with high export intensity. Since new exporters face high variable costs of exporting, their foreign sales are low compared to their domestic sales. However, as their variable costs fall, their foreign sales increase driving their export intensity up. Moreover, the unlucky exporters that stay with the high variable trade shocks, which have low export intensity, are more likely to exit. Therefore, the model with stochastically decreasing variable costs of export implies that export intensity is increasing in the length of the export spell. This, however, should not come as a surprise given that this specification was designed to deliver this fact (see Alessandria and Choi, 2014).

Export Exit Rate. To understand how the presence of stochastically decreasing trade costs affect the export exit rate, note that firms that enter have high productivity but suffer initially from high variable costs of trade. Over time, conditional on exporting, both their trade costs and productivity will, on average, decrease. On the one hand, decreasing trade costs make exporting more profitable and hence increase incentives for the firm to keep exporting. On the other hand, decreasing productivity makes exporting less attractive. The first of these two forces tends to induce decreasing export exit rate while the second, in the presence of high sunk costs, tends to lead to an increasing hazard rate. Whether this model can also deliver a decreasing hazard rate will depend on the parameters of the model. However, given that stochastically decreasing variable trade shocks typically imply low sunk costs, this model has a higher chance of delivering decreasing exit rate than the previous extensions.

1.3.3 Quantitative results

Above we argued that the sunk cost model with stochastically decreasing trade shocks has the potential to account for the three features of new exporter dynamics that we study in the paper. In this section we investigate whether a calibrated version of this model can actually deliver these facts.

Introducing stochastically decreasing trade shocks adds potentially a large number of parameters ($\{\tau_1, \tau_2, ..., \tau_N\}$ and p). To limit the number of new parameters, we assume that the lowest and highest trade shocks are equal to $\tau - x$ and $\tau + x$, where τ is the iceberg cost obtained by calibrating the benchmark sunk cost model, and we choose an equally spaced grid between these two endpoints. We set the number of variable trade cost values to eleven. This is not essential but it gives the model the best chance in matching both the aggregate moments and dynamics.[11] We then calibrate x and the transition probability p in order to

[11] Holding the lower and upper bound constant, as the number of grid points increases, it weakens the forces that can potentially deliver the new exporter dynamics. This is because exporters begin with the highest trade cost and will face higher average trade costs. While one could potentially adjust p in order to

match the initial median export intensity of new exporters (export intensity among firms that exported only for one period) and the median export intensity among all exporters.[12] The remaining parameters are calibrated as in the other extensions.

Table 7: Calibration with iceberg cost shocks

γ	0
σ	5
β	0.98
τ	1.52
F	1.60
S	3.27
ρ	0.77
σ_ε	0.18
κ	0.25
η	0.04
x	0.09
p	0.69

Table 7 reports the parameters used to calibrate this extension. As before, we divide parameters into three groups. The first group of the parameters is set to the same values as in the benchmark sunk cost model. The second group of parameters consists of parameters that are also present in the benchmark sunk cost model, and we choose the same moments as before to calibrate these parameters. Finally, the third group of parameters is the set of parameters that were not present in the benchmark sunk cost model. These parameters are calibrated using the moments described above.

Table 8 reports the fit of the model while Table 9 reports the implied new exporter dynamics. The model is able to match all the target moments but fails to match the export dynamics observed in the data: the growth of export sales is negative, export exit rate is increasing and export intensity is constant over time. This is because, in order to match the median export intensity, the dispersion of trade shocks cannot be too large and the probability of transitioning to face a lower trade shock cannot be too high. This means,

strengthen the role of trade shocks in driving new exporter dynamics, this creates another difficulty: with high p, exporters tend to achieve the lowest trade costs too often. This results in too high export intensity but also makes it difficult for the model to match export exit and entry rates. There are too many exporters with the low trade shocks that are highly unlikely to exit, and increasing fixed costs to induce them to exit has the undesirable consequence of discouraging entry.

[12] In the previous extensions all firms faced variable export cost τ, calibrated to deliver the observed median export intensity.

Table 8: Target moments with trade shocks

Target Moments	Data	Sunk costs
Export entry rate	0.03	0.03
Export exit rate	0.11	0.11
Median exports/sales	0.16	0.16
Median exporter size premium	4.81	4.81
Share of small exporters	0.03	0.03
Share of large exporters	0.24	0.22
Share of very large exporters	0.66	0.70
1st-year median exports/sales	0.13	0.13

Notes: "Small exporters" are exporters in the 1st quartile of the size distribution, ranked by total sales. "Large exporters" are exporters in the 3th quartile of the total sales distribution. "Very large exporters" are exporters in the top quartile of the total sales distribution. See section 5.1 in the paper for a detailed description of each target moment.

Table 9: New exporter dynamics with trade shocks

Years as an exporter	Export Growth	Export Exit Rate	Export Intensity
1		0.08	0.130
2	-0.20	0.16	0.136
3	-0.15	0.17	0.142
4	-0.15	0.15	0.142

then, that the impact of stochastically decreasing trade costs on export dynamics is low compared to the role of productivity shocks.

Interestingly, even if we are willing to accept a median export intensity higher than in the data, the model is still unable to simultaneously match the remaining aggregate moments and new exporter dynamics. The model can generate a decreasing hazard rate only if the probability of facing lower trade costs tomorrow is high enough, and this decrease is large enough. On the other hand, in order to generate increasing export sales, productivity has to be sufficiently persistent. But with high persistence and a steeply decreasing profile of trade costs the model implies counterfactually low exit and entry rates, and a counterfactually high exporter size premium.[13]

[13] The exit rate is low because for low values of iceberg costs firms decide to keep exporting for most of the realizations of productivity, and the transition probability to low iceberg costs is high. Entry is low because

1.4 Labor adjustment costs

1.4.1 Specification

In this section we introduce convex labor adjustment costs into the model and assume that firms can adjust their labor in response to their current productivity shock but it is costly to do so. More precisely, if a firm wants to adjust its current amount of labor to n', from its past value of n, then it has to incur an adjustment cost $g(n',n) = \xi\left(\frac{n'-n}{n}\right)^2 n$, where ξ captures the magnitude of the labor adjustment costs. This specification of labor adjustment cost is similar in spirit to the labor adjustment costs assumed in Hamermesh, 1989, Hopenhayn and Rogerson, 1993, or Cooper and Willis, 2009.[14]

In this specification, the firm's past employment level becomes a state variable. As a result, under risk-neutrality and without assets, the dynamic problem of an entrepreneur can be written as:

$$v(z,e,n) = \max_{e',n'} \pi(z,e,e',n') - g(n',n) + \beta\mathbb{E}_z\left[v(z',e',n')\right]$$

where the firm chooses its current export status, e', and current employment level, n', taking as given its past export status, e, its past level of labor, n, and its current productivity, z. $\pi(z,e,e',n')$ is the profit function before incurring adjustment costs (defined analogously to the profit function in the benchmark model), while $g(n',n)$ is the cost associated with adjusting labor from n to n'. Finally, the expectation is taken over the future values of the productivity shock.

As in the benchmark sunk cost model we assume that there are permanent differences across firms in terms of their export entry and continuation costs. That is, in the model, a fraction η of firms have low entry and continuation costs (given by $(S+F)\kappa$ and $F\kappa$, respectively), while the remaining fraction $1-\eta$ of firms have high entry and continuation costs (given by $S+F$ and F, respectively).

1.4.2 Intuition

In the model with labor adjustment costs, export entry and exit decisions depend on both the current realization of productivity and the amount of labor hired by the firm on the previous period. In particular, firms with a low level of labor last period are less likely to

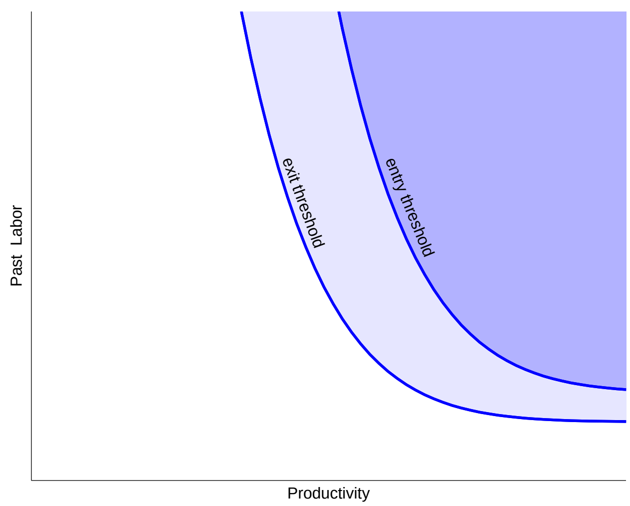
in order to have positive exit, given low average iceberg costs, fixed costs have to be very high. Since new exporters face high iceberg costs, this fixed cost is prohibitively high for all except the few potential entrants with extremely high productivity. Finally, with high persistence export size premium is very large because exporters stay large for a longer period of time. This is further reinforced by steeply decreasing iceberg costs which drive export sales even higher. Given these issues, we were unable to find a calibration that could deliver the new exporter dynamics and at the same time match the aggregate moments of our data.

[14] Alternatively, in addition to making adjusting labor costly, we could require firms to decide their labor one period in advance. The specification we chose is closer to the existing literature and it constitutes a minimal deviation from our benchmark sunk cost model.

export today compared to firms with high labor. On the one hand, for any given productivity level, fewer workers imply lower profits from exporting; on the other hand, expanding the number of workers is costly. Therefore, firms with low labor force choose not to export, even when their productivity is high, simply because achieving the scale required for exporting to be profitable is too costly in terms of labor adjustment costs. As a consequence productivity thresholds for entry and exit from the export market are decreasing functions of the past level of labor (see Figure 4).

What is harder to deduce from Figure 4 is that the presence of adjustment costs induces also more persistence in firms' export status. Intuitively, firms with low levels of past employment are now less likely to become exporters while exporters with large workforce are less likely to switch to domestic production only. This is because, given the convex labor adjustment costs, rapidly shrinking or expanding the labor force by the amount associated with changing firm's export status is very costly. Thus, a firm that received a low productivity shock, instead of exiting the export market immediately, chooses to export for several periods more during which it gradually decreases its labor before making a switch to domestic production only. A similar logic applies to firms' entry decisions.

Figure 4: Decision rules with labor adjustment costs



Notes: The dark area corresponds to combinations of (n, z) such that firms find it optimal to export (regardless of their past export status). The lighter area corresponds to the realizations of (n, z) such that firms find it optimal to export only if they exported in the previous period.

Export Growth. A model with sunk and labor adjustment costs has the potential to deliver increasing export sales. To see this, suppose that the adjustment costs are high and productivity is relatively persistent. High adjustment costs force firms to adjust their labor only gradually. Thus, firms that enter the foreign market in response to a positive productivity shock start exporting with a level of labor far below its optimal level. In addition, high persistence of productivity shocks implies that the optimal level of labor will stay high for several periods. As a result, new exporters gradually increase their labor towards its optimal level, which translates into steadily increasing foreign sales.

It is important to note that the above argument hinges on the assumption of highly persistent productivity shocks and sizable adjustment costs. With low persistence of productivity shocks, the optimal level of employment decreases fast. If persistence is low enough, then new exporters' initial choice of labor, while below the optimal level today, might be above the optimal level tomorrow. As a result, the following period, continuing exporters would adjust their labor down which would imply negative export growth. On the other hand, with low adjustment costs firms' labor choices follow closely their productivity shocks, and the export dynamics resembles that of a model with only sunk costs, as described in the paper. That is, firms choose high labor upon entry, and then steadily decrease it as productivity shocks revert to their mean. This, however, translates into decreasing growth for export sales. Thus, the model requires both persistent productivity shocks and high adjustment costs to generate increasing export sales.

Export Intensity. The presence of labor adjustment costs has no effect on the optimal export intensity, which is determined by the magnitude of the iceberg cost, τ, and the relative characteristics of the domestic and the foreign markets (PQ and P^*Q^*). Since these parameters stay constant over firms' export spells, a model with sunk costs and labor adjustment costs implies a constant export intensity, just like the benchmark sunk cost model.

Export Exit Rate. A model with sunk costs and labor adjustment costs can deliver a decreasing export exit rate among new exporters. To see this, suppose that labor adjustment costs are high, productivity is very persistent, and sunk costs are low. Recall that with high adjustment costs firms adjust their labor only gradually. Therefore, firms that enter the foreign market start exporting with a level of labor far below their optimal choice. However, low labor implies that profits from exporting are low and, thus, even a small negative productivity shock renders exporting unprofitable. It follows that the initial exit rate among new exporters is high.

If productivity shocks are persistent, exporters' optimal level of labor stays high for several periods and, as a result, continuing exporters keep expanding their labor gradually. With higher labor, exporting is profitable for a wider range of productivity realizations and, hence, continuing exporters are less likely to exit the foreign market. It follows that export exit rate among new exporters is decreasing in the length of the export spell.

Note, however, that the above argument depends on the parameters of the model. With high sunk costs, the initial exit rate will be low as firms that enter are far from the exit threshold. If, in addition, persistence of the productivity shocks is low, then the new exporters' profits decrease rapidly (even though, with high adjustment costs, new exporters might be expanding their labor). As profits decrease, firms become less resilient, and even small negative shocks might render exporting unprofitable, which translates into an increasing exit rate. Finally, low adjustment costs imply that firms' labor choices follow closely their productivity shocks. Since productivity shocks are mean reverting it follows that, in this case, as firms' continue exporting, their export profits on average decrease - a force that tends to generate an increasing hazard rate in the benchmark sunk cost model.

1.4.3 Quantitative results

As argued above, the potential of this specification to deliver increasing export sales and a decreasing exit rate among new exporters depends on the parameters of the model. In this section we investigate whether a calibrated version of this model can generate such dynamics.

Table 10: Calibration with adjustment costs

γ	0
σ	5
β	0.98
ρ	0.84
τ	1.51
σ_{ε}	0.17
F	2.12
S	1.72
κ	0.16
η	0.15
ξ	0.06

Table 10 reports the parameters used to calibrate this version of the model. Again, we divide the parameters into three groups. The first group is set to the same values as in the benchmark sunk cost model. The second group consists of parameters that are also present in the benchmark sunk cost model, and are calibrated using the same moments. Finally, the third group consists of the parameters that were not present in the benchmark sunk cost model. In this third group, ξ is chosen to match the median autocorrelation of the labor wage bill observed in the data.[15]

Table 11 reports the fit of the model while Table 12 reports the implied new exporter dynamics. The model matches closely all the aggregate target moments, including the autocorrelation of labor. On the other hand, as in the case of previous extensions, the model

[15] This is a natural target moment since high adjustment costs translate into high autocorrelation of labor, while low adjustment costs imply low autocorrelation.

Table 11: Target moments with labor adjustment costs

Target Moments	Data	Model
Export entry rate	0.03	0.03
Export exit rate	0.11	0.11
Median exports/sales	0.16	0.16
Median exporter size premium	4.81	4.84
Share of small exporters	0.03	0.03
Share of large exporters	0.24	0.22
Share of very large exporters	0.66	0.70
$Corr(n_t, n_{t-1})$	0.62	0.62

Notes: "Small exporters" are exporters in the 1st quartile of the size distribution, ranked by total sales. "Large exporters" are exporters in the 3th quartile of the total sales distribution. "Very large exporters" are exporters in the top quartile of the total sales distribution. See section 5.1 in the paper for a detailed description of each target moment.

Table 12: New exporter dynamics with labor adjustment costs

Years as an exporter	Export Growth	Export Exit Rate	Export Intensity
1		0.08	0.16
2	0.22	0.16	0.16
3	0.03	0.17	0.16
4	-0.04	0.17	0.16

does relatively poorly matching the dynamics of new exporters: the growth of export sales is positive only in the first two periods and negative afterwards, export intensity is constant over time, while exit rate is initially increasing and then stays constant. The key for this result is that estimated sunk costs are relatively high and estimated persistence is relatively low. With these parameters, the presence of adjustment costs is not enough to reconcile the model with the data.

It is important to note that it is possible to constrain sunk costs to be zero and recalibrate the model subject to this constraint. In this case, the model implies increasing export sales and a decreasing exit rate. However, even with sunk costs equal to zero the model still predicts a constant export intensity, and more importantly, it features a large positive growth of domestic sales upon entry.[16] In contrast, our model with financial frictions can not only

[16] This is because firms always adjust their labor upon entry to the export market. The presence of labor adjustment costs affects only the magnitude of this adjustment.

match the new exporter dynamics and the aggregate target moments, but it also implies a sudden drop in the growth domestic sales, as observed in the data.

2 Model with capital

In this section we introduce capital into our benchmark model and investigate whether this affects any of our main findings. We assume that firms operate market-specific Cobb-Douglas production functions that take as inputs both labor and physical capital. Moreover, we interpret assets held by firms, a, as their accumulated stock of capital. As in the benchmark model, firms can use their assets to raise external funds which implies that a now plays a role both as a production input and as collateral. Otherwise, the setup is the same as our benchmark model.

2.1 Specification

To keep the model simple we assume that firms use all of their capital stock a for both domestic and foreign production, that is:

$$\begin{aligned} q =& z n^{1-x} a^x \\ q^* =& \frac{1}{\tau} z n^{*1-x} a^x \end{aligned}$$

where q and q^* denote production for the domestic and foreign markets, respectively, and x is the share of capital in production. Finally, since a now denotes firms' stock of capital, we assume that a does not earn an interest rate, but instead it depreciates each period at an exogenous rate $\delta > 0$.

We now describe the static and dynamic problems of the firm, and emphasize the main differences with the benchmark model.

Static problem. The static problem of a firm with productivity z, assets a, and past and current export status, e and e', is given by:

$$\begin{aligned} \pi(a, z, e, e') = & \max_{n, n^*, q, q^*} pq - wn + e' \left[p^* q^* - wn^* - wF - (1-e) wS \right] \\ & s.t. \\ & n = \left(\frac{q}{z a^x} \right)^{\frac{1}{1-x}}, \quad n^* = \left(\frac{\tau q^*}{z a^x} \right)^{\frac{1}{1-x}} \\ & q = \left(\frac{p}{P} \right)^{-\sigma} Q, \quad q^* = \left(\frac{p^*}{P^*} \right)^{-\sigma} Q^* \\ & \alpha wn + e' \left[wF + (1-e) wS + wn^* \right] \leq \lambda a \end{aligned}$$

Thus, the static problem of a firm is to choose how much to produce for the domestic market and, if it chose to export this period, how much to produce for the foreign market subject to the domestic and foreign demand schedules, its production technology, and its borrowing constraints. Note that the only difference in the static problem compared to the benchmark model is the presence of assets in firm's labor demand equations.

Dynamic problem. Next, we describe the dynamic problem faced by the entrepreneur. The relevant individual state variables are: firm's productivity level, z, the amount of assets the firm holds, a, and the past export status, e.[17]

Let $v(a, z, e)$ be the value function of a firm with assets a, productivity z, and past export status e, that chooses whether to export or not, and how much to save. The value function for a firm is given by:

$$\begin{aligned} v\left(a, z, e\right) &= \max_{c, a', e'} \left\{ \frac{c^{1-\gamma}}{1-\gamma} + \beta E\left[v\left(a', z', e'\right)\right] \right\} \\ s.t. \quad c + a' &= a(1-\delta) + \pi\left(a, z, e, e'\right) \end{aligned}$$

where the expectation is taken over the future values of productivity shocks. The Euler equation associated with the above dynamic problem is given by:

$$\beta E\left[\left((1-\delta) + \pi_a(a', z', e', e'')\right) \left(\frac{c'}{c}\right)^{-\gamma} \right] = 1$$

We see that the only difference in the dynamic problem and Euler equation compared to the benchmark model is the presence of depreciation rate, δ, instead of interest rate, r, in the budget constraint and in the expression for the expected return on assets, a.[18]

2.2 Intuition

In this section we discuss how the introduction of capital into the financial frictions model (with no sunk cost) affects entrepreneurs' consumption-savings decisions and firms' entry and exit decisions, as well as firms' optimal export intensity.

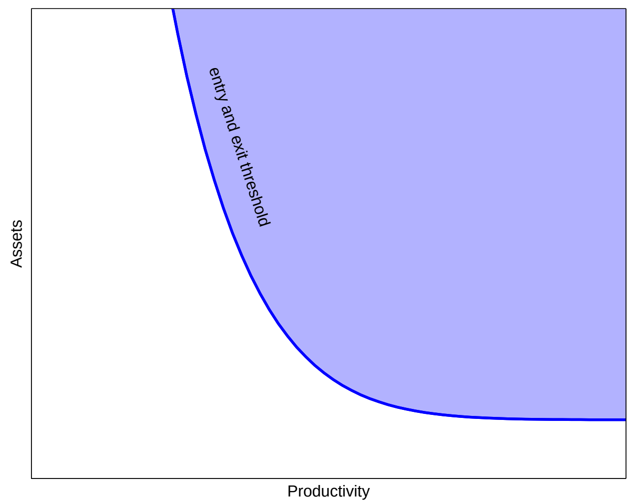
Consider first entrepreneurs' consumption-savings decisions. When assets are also used as physical capital, the entrepreneurs have stronger incentives to delay consumption and accumulate assets. This is because, now, an additional unit of asset not only relaxes the borrowing constraint but it also translates into higher output, an effect that is absent in the benchmark model. This encourages entrepreneurs' to accumulate capital and makes them more likely to "grow" out of the financial constraints, undermining the mechanism through which financial frictions deliver the new exporter dynamics. One should note, however, that whether this force can actually undo the impact of financial frictions depends on the assumed discount rate and depreciation rate of capital. With low β and high δ, entrepreneurs' incentives to accumulate assets are low and hence financial frictions will be binding in the steady state. Thus, while it is true that in the model with capital entrepreneurs have higher incentives to save, whether this undermines our mechanism will depend on the details of the calibration.

[17] The aggregate state variables are P, Q, P^* and Q^*, the aggregate price levels and aggregate demands at home and abroad. To simplify the notation we omit aggregate state variables when writing the dynamic problem.

[18] To obtain the same formulation as in the benchmark model, set $\delta = -\frac{r}{1+r}$, and assume that this depreciation applies to assets tomorrow.

Introducing capital also affects firms' entry and exit decisions. A higher stock of physical capital not only allows firms to raise more external funds but it also leads to higher output. Therefore, for any given productivity level, firms with higher capital stock can sell more in the foreign market and find it more profitable to export. Therefore firm's export entry and exit decisions are now more linked to their asset holdings than in our benchmark model which translates into greater curvature of the productivity entry-exit threshold (see Figure 5).

Figure 5: Decision rules with capital



Notes: The dark area corresponds to combinations of (z, a) such that firms find it optimal to export.

Finally, the presence of capital in the production function affects the optimal export intensity. This can be seen from the optimal expression for the ratio of export sales to domestic sales for the unconstrained firms:

$$\frac{\hat{p}\hat{q}}{\hat{p}^*\hat{q}^*} = \left(\frac{PQ^{\frac{1}{\sigma}}}{P^*Q^{*\frac{1}{\sigma}}}\right)^{\frac{\sigma}{x(\sigma-1)+1}} \tau^{\frac{\sigma-1}{x(\sigma-1)+1}}$$

For a given τ, as the share of capital increases, the optimal share of foreign sales also increases (given $\sigma > 1$), even for unconstrained firms. The above expression indicates that export intensity of unconstrained exporters is constant over time and independent of capital. On the other hand, capital plays an important role in determining export intensity of the constrained exporters (the reason for that is analogous to the one in the benchmark model, see section 4.3 in the paper for details).

Having described the effect of capital on firms' (and entrepreneurs') decisions, we discuss next how the presence of capital in production affects the new exporters dynamics.

Export Growth. Note that the presence of physical capital actually provides another source of growth for export sales. This is because entrepreneurs accumulate their assets only slowly, due to the financial constraint and the consumption-savings trade-off, as in the benchmark model. Thus, in response to positive shocks, they gradually increase their capital stock, which not only relaxes their borrowing constraint, as in the benchmark model, but also leads directly to higher output since capital is one of the production inputs. It follows that, holding everything else constant, introducing capital into the model results in higher export growth than before.

Export Intensity. Whether a model with capital leads to an increasing export intensity depends on the calibration details. As long as firms enter the export market constrained, and exporting is associated with higher working capital requirements, export intensity will be increasing over the first few periods following their entry into the foreign market.

Export Exit Rate. As in the case of export growth, introducing capital into our model only strengthens the prediction of a decreasing hazard rate. Note that non-exporters optimally hold less capital than exporters since entrepreneurs with low productivity choose to run down their assets and consume their wealth. Therefore, new exporters that enter the foreign market in response to a high productivity shock will typically enter with a low capital stock. As they export, however, they choose to accumulate physical capital thanks to their high productivity and additional profits from sales abroad. The higher physical capital stock not only relaxes the firms' borrowing constraint (allowing them to hire more labor) but also directly leads to higher output for any given level of labor. Both of these channels increase firms' profits and hence lead to a wider range of productivity shocks for which they find it optimal to export. This decreases the probability that they exit the foreign market resulting in a decreasing export exit rate.

2.3 Quantitative results

In this section we show that the above intuition is supported quantitatively. In particular, we calibrate the model using a similar strategy as in the case of our benchmark model. In the model with capital there are two new parameters compared to our benchmark model, the share of capital in the production function, x, and the rate of depreciation, δ. We set these parameters to standard values, letting $x = 0.3$ and $\delta = 0.1$.

Table 13 reports the parameters used to calibrate this extension. We divide parameters into three groups. The first group of the parameters is set to the same values as in the benchmark financial frictions model. The second group consists of the new parameters introduced in this extension. Those are set to standard values. Finally, the last group is calibrated to match the same moments as in the financial frictions model.

Table 14 reports the fit of the model. We see that the model with capital is able to match all of the target moments. One should note, however, that in order to achieve that we need to set a low discount rate. If the discount rate is high, firms accumulate a lot of assets and, hence are mostly unconstrained. In this case, the model implies an external finance to sales

Table 13: Calibration of financial frictions model with capital

γ	2
σ	5
λ	1.64
x	0.3
δ	0.1
β	0.64
F	0.75
η	0.15
κ	0.11
τ	2.49
ρ	0.70
σ_ε	0.23
α	0.93

ratio that is much lower than the one observed in the data.[19]

In Table 15 we report the new exporter dynamics implied by the model. In light of the above discussion it is not surprising that the model can deliver the new exporter dynamics observed in the data: positive export growth, decreasing export exit rate, and increasing export intensity. However, export intensity increases very little following entry to the foreign market. This is because, in order to match the external finance to total sales ratio, the relative asymmetry in working capital needs between domestic and foreign production, α, is set to a value close to 1. As argued in the paper in section 4, this asymmetry is key for delivering an increasing export intensity.

The above results indicate that introducing capital into our model does not invalidate our results.

[19] Recall that external finance is measure as the amount borrowed, that is, the difference between working capital needs and the assets the firm holds.

Table 14: Target moments in model with capital

Target Moments	Data	Model with capital
Export entry rate	0.03	0.03
Export exit rate	0.11	0.11
Median exports/sales	0.16	0.16
Median exporter size premium	4.81	4.85
External finance/sales	0.12	0.12
Share of small exporters	0.03	0.03
Share of large exporters	0.24	0.19
Share of very large exporters	0.66	0.64

Notes: "Small exporters" are exporters in the 1st quartile of the size distribution, ranked by total sales. "Large exporters" are exporters in the 3th quartile of the total sales distribution. "Very large exporters" are exporters in the top quartile of the total sales distribution. See section 5.1 in the paper for a detailed description of each target moment.

Table 15: New exporter dynamics in a model with capital

Years as an exporter	Export Growth	Export Exit Rate	Export Intensity
1		0.30	0.1579
2	0.24	0.23	0.1585
3	0.18	0.19	0.1593
4	0.09	0.17	0.1597

3 Model with homogeneous export entry costs

In the quantitative analysis section of the paper, we introduced a small fraction of firms that were subject to small export entry costs. We then argued that this extension is only needed for quantitative reasons, and it does not affect any of the conclusions of the paper. In this section we calibrate a simpler version of the model with only one type of firms, and we show that the main results of the paper still hold. More precisely, we assume that every firm faces the same entry costs if they want to export in the current period: F if the firm exported the previous period, and $F + S$ if the firm did not export the period before.[20]

In the remainder of this section we calibrate the model for both the financial frictions and sunk cost models, and replicate the results in our paper.

[20] i.e. Assume either $\eta = 0$ or $\kappa = 1$ in the quantitative analysis section.

3.1 Calibration

We choose the model parameters following the same calibration strategy as in the paper. We use SMM to minimize a distance function between the target moments and the simulated moments for given parameters.[21]

Table 16: Calibration

	Financial frictions	Sunk costs
γ	2	2
σ	5	5
λ	1.64	-
β	0.80	0.92
F	1.00	0.90
S	-	4.17
τ	1.45	1.51
ρ	0.94	0.78
σ_{ε}	0.09	0.16
α	0.48	-

Now we have two less parameters to calibrate (η and κ), but we choose to match the same moments as before, so the model is overidentified.[22] As before, we set the risk aversion parameter, γ, and the elasticity of substitution across varieties, σ, to the same standard values in both models, and choose the remaining parameters following the strategy described above.

Table 16 presents the chosen parameters, and Table 17 shows that both models match the target moments relatively well. However, now none of these models can match the moments as well as before, in particular the size distribution of exporters ranked by total sales. This is due to the lack of two parameters: the share of firms that face small export entry costs, and the value of the small export entry costs.

3.2 New exporter dynamics

In this subsection we show that the financial frictions model with homogeneous export entry costs can replicate the new exporter dynamics in the data, while the sunk cost model cannot.

[21] For more details on the calibration strategy, please see subsection 5.1: Calibration, in the paper.

[22] Alternatively, we could have chosen to match only one moment of the export size distribution. We decided for this alternative because it is closer to what we did in the paper.

Table 17: Target moments

	Data	Financial frictions	Sunk costs
Export entry rate	0.03	0.03	0.03
Export exit rate	0.11	0.11	0.11
Median exports/sales	0.16	0.17	0.16
Median exporter size premium	4.81	5.33	4.82
External finance/sales	0.12	0.13	0.12
	Size distribution of exporters by total sales		
$\Phi^X_{(0,25)}$	0.03	0.00	0.00
$\Phi^X_{(50,75)}$	0.24	0.10	0.27
$\Phi^X_{(75,100)}$	0.66	0.90	0.72

Export exit rate. Figure 6 presents the median export exit rate across cohorts of new exporters, for each of the first four years since becoming an exporter. As before, our model implies a decreasing export exit rate, and that the initial and final levels are close to those in the data. In contrast, the sunk cost model implies an *increasing* export exit rate.

Exports growth. Figure 7 presents the median exports growth rate across the set of firms that export for at least four consecutive periods. Both in our model and in the data, firms exhibit positive exports growth over the first few periods after entering the export market. On the other hand, the sunk cost model implies a *negative* exports growth rate.

Export intensity. Figure 8 presents the median export intensity across the set of firms that export for at least four consecutive periods. Our model implies increasing export intensity over the firms' first four years in the export market, as in the data. In contrast, the sunk cost model implies a *flat* export intensity.

Figure 6: Export exit rate

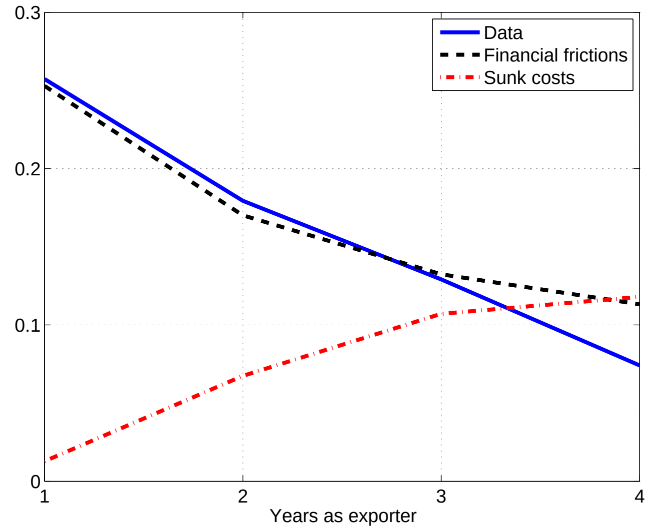


Figure 7: Export sales growth

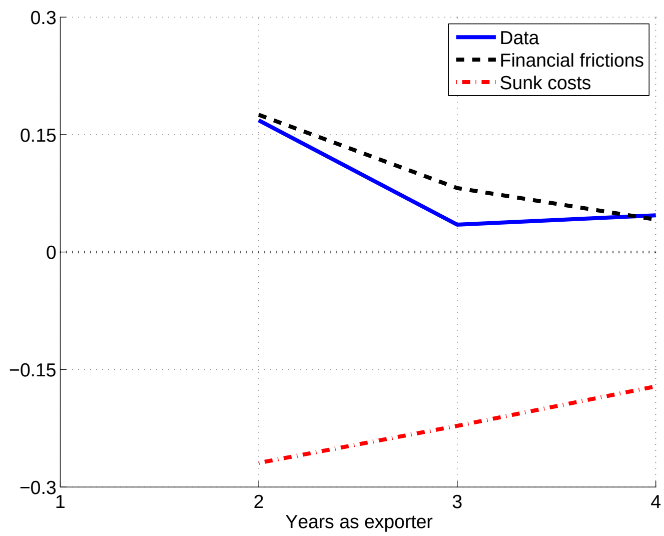
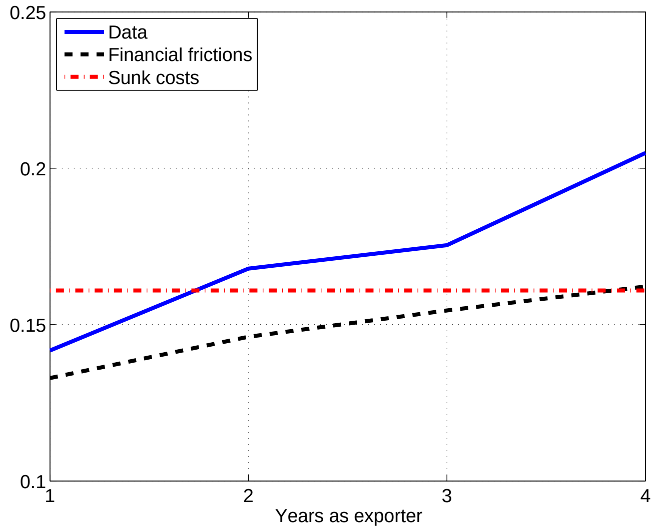
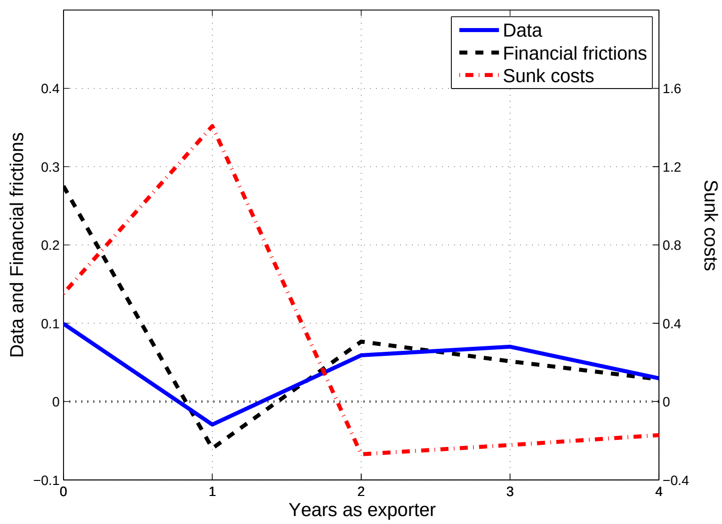


Figure 8: Export intensity



3.3 Other features of new exporter dynamics

Figure 9: Domestic sales growth



Domestic sales growth. Figure 9 presents the median domestic sales growth rate across the set of firms that export for at least four consecutive periods, and which sell domestically for at least one period before becoming exporters.[23] In the data, firms feature *negative* domestic sales growth upon entry to the foreign market, while domestic sales growth is positive thereafter.

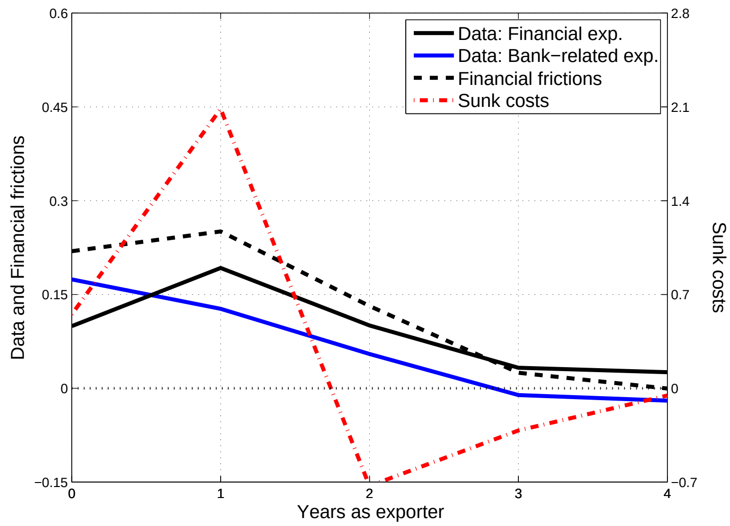
Our model captures the negative growth of domestic sales upon entry to the export market, while implying positive growth thereafter. The magnitudes are tightly aligned with those observed in the data. Instead, the sunk cost model implies *positive* domestic sales growth upon entry to the foreign market, while implying *negative* growth thereafter.

External finance dynamics. Figure 10 plots the growth for two alternative measures of external finance for cohorts of new exporters in the data, together with the analogous measure from the financial frictions model and the sunk cost model.[24] We observe that the dynamics of external finance implied by our model are consistent with those observed in the data: the growth of external finance is highest upon entry, and decreases thereafter, getting close to zero by the fourth year in the export market. On the other hand, the sunk cost model implies a very large growth upon entry, followed by negative growth after the first period.

[23] We exclude firms that export upon birth to keep the sample size constant over time, avoiding the growth of domestic sales from being driven by changes in the composition of the cohort.

[24] For more details on how we compute these measures, please refer to the paper, section 5.3

Figure 10: External finance dynamics



Stoppers. Figure 11 plots the share of plants that choose to re-enter the foreign market within any of the first four years after they stopped exporting in the data, and compares them with the same statistics in our model with financial frictions and the sunk cost model. In the data, we observe that 29% of firms that stopped exporting choose to re-enter the export market in the following year. This share is decreasing in the number of years after the exit from the export market. Our model can capture these features of the data. In contrast, the sunk cost model is largely at odds with the data: only a very small share of new non-exporters re-start exporting in the following year, and this fraction is increasing in the number of periods since the last foreign transaction.

Table 18 reports the relative size, as measured by the median number of workers, of new non-exporters relative to both exporters and non-exporters. In the data, we observe that new non-exporters are approximately half as large as the median exporter, approximately two-and-a-half times as large as the median non-exporter, and 12% smaller than the median new exporter.[25] The financial frictions model is largely in line with these patterns of the data. In contrast, the sunk cost model implies that new non-exporters are approximately the same size as non-exporters at odds with the data, and much smaller than exporters.

[25] "New non-exporters" are non-exporters that exported the year before. "New exporters" are exporters that didn't export the period before.

Figure 11: Non-exporters re-entry rate

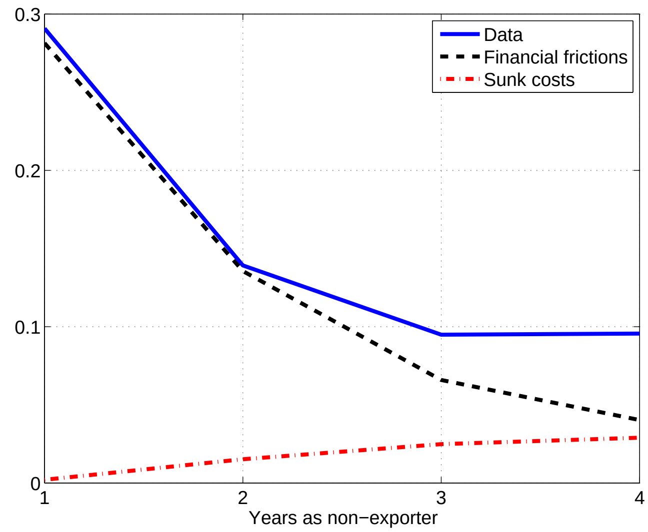


Table 18: Median number of workers

	Data	Financial frictions	Sunk costs
Stoppers / Exporters	0.52	0.38	0.17
Stoppers / Non-exporters	2.50	2.00	0.83
Stoppers / New exporters	0.88	0.54	0.09

3.4 Policy analysis

In this subsection we show that our policy results also hold in a model with homogeneous export entry costs. We consider below the same two policy experiments as in the paper. First, we investigate how financial constraints affect the impact of a trade liberalization, relative to the implications of the frictionless sunk cost model. Second, we use our model to study the effect of policies aimed at reducing the impact of financial frictions.[26] For further details on these exercises, please refer to the paper, section 6: Policy Analysis.

Trade liberalization. We model trade liberalization as a reduction in the variable costs faced by firms. We consider an experiment where the policy related trade costs are reduced by 10 percentage points (i.e. a fall in τ by 0.1 from its benchmark value), and study the steady-state effects of this policy both in the financial frictions model and the sunk cost model. We then compare the results across the two models to see how the presence of financing constraints affects the gains from a trade liberalization.

Table 19: Effects of trade liberalization

Differences with respect to benchmark			
	Financial Frictions	Sunk Costs	Difference
Exports	49.9%	74.0%	-24.1pp
Total Sales	4.6%	6.8%	-2.2pp
Exports/ Total Sales	43.3%	63.0%	-19.7pp
Share of Exporters	33.7%	74.6%	-40.9pp
Median Exports	11.4%	-4.9%	16.3pp

Notes: We report percentage differences implied by a change in τ from its benchmark value $\tau = 1.45$ in the case of financial friction model and $\tau = 1.51$, in the sunk cost model).

Table 19 reports the results of a trade liberalization when all firms face the same export entry costs. As in the case of heterogeneous export entry costs, total sales and exports increase more in the sunk cost model than in the financial frictions model, although the difference is larger for exports now. This is because in the sunk cost model with only one type of firms there is a larger number of firms close to the productivity export entry threshold level.

One important difference with the case of heterogeneous export entry costs analyzed in the paper is that now there is more entry of small firms into the export market in both

[26] Given the partial equilibrium nature of our model, we study the implications of these policies on a small industry.

Table 20: Effects of changes in the collateral constraint

Differences with respect to benchmark, $\lambda = 1.64$	Eurozone $\lambda = 1.77$	No Frictions $\lambda = \infty$	Autarky $\lambda = 1$
Collateral per $ borrowed	1.29	0	∞
Exports	7.0%	107.0%	−46.5%
Total Sales	2.8%	37.7%	−20.5%
Exports/ Total Sales	4.1%	50.4%	−32.7%
Share of exporters	4.7%	82.0%	−36.9%
Median Exports	0.0%	8.2%	−7.6%

Notes: We report percentage differences implied by changes in with respect to the benchmark model ($\lambda = 1.64$).

models. This is because the estimated fixed costs are lower, and the productivity distribution in the sunk cost model is more concentrated around the mean, implying that more firms are close to the export threshold. On the other hand, with higher entry there are more small firms, implying that median exports increase by less than in the case analyzed in the paper.[27] Therefore, the importance of the extensive margin increases at the expense of the intensive margin.

In summary, the results above suggest that financial frictions limit the positive effects of a trade liberalization, just as they do in the case with heterogeneous export entry costs.

Financial liberalization. We investigate the macroeconomic implications of a financial liberalization modeled as an increase in the amount that can be borrowed per unit of collateral.

As we did in the paper, we consider the following cases: (1) $\lambda = 1.77$, which represents a relaxation of the financial constraint; (2) $\lambda = \infty$, which corresponds to the model without financial frictions; (3) $\lambda = 1$, which corresponds to the case of financial autarky.

Table 20 shows that relaxing the collateral requirements from 1.56 (benchmark) to 1.3 units of collateral per dollar borrowed, leads to a 7.0% increase in exports, a 2.8% increase in total sales, and 4.1% growth in the exports to sales ratio. These numbers are similar to the ones obtained in the case of heterogeneous export entry costs. Also, shutting down financial markets results in large drops in total sales (20.5%), and in exports (46.5%), as it was the case before.

However, now there are important differences in the statistics measuring the margins along which financial frictions affect exports. Without firms facing small export entry costs,

[27] This also happens with average exports.

alternative values of λ imply larger changes in the share of exports, and smaller changes in median exports. Thus, in the model with homogeneous fixed costs, the extensive margin becomes more important. This is because now the calibrated entry fixed cost is smaller and, therefore, more firms find it optimal to export given the same change in λ. Moreover, now there are no small firms that always export, as it was the case with heterogeneous fixed costs. In that case these small firms were only adjusting through the intensive margin, increasing its relative importance.

Summarizing, in the case of homogeneous fixed costs, a financial liberalization implies more relative importance of the extensive margin, in line with the results by Berman and Hericourt (2010).

4 Empirical evidence

In the paper we argued that financial frictions are the key driver of new exporter dynamics and we presented three pieces of evidence that support this hypothesis. First, we documented that our model generates dynamics of domestic sales that are consistent with the data. Second, we showed that our model generates dynamics of external finance expenditures observed in the data. Third, we showed that our model implies export re-entry dynamics of firms that recently stopped exporting which are consistent with the data. In this section we provide further evidence that support our hypothesis. In particular, we investigate the extent to which the dynamics of new exporters differ between firms that are more financially constrained and those that are less financially constrained.

4.1 Our approach

Data. We begin by classifying new exporters into two groups: "more constrained" and "less constrained". Since in the data we cannot directly observe whether a firm is financially constrained or not, we categorize firms following the approach pursued by a large literature initiated by the seminal contribution of Rajan and Zingales, 1998.

This approach classifies industries according to the degree to which they depend on external finance to pay for capital expenditures. The idea is that different industries operate technologies that lead to different external finance needs – for instance, some industries require large investments to be made before internal funds begin to build up, leading to larger external finance needs, while others have a better alignment between the capital expenditure needs and the inflow of internal funds. Rajan and Zingales, 1998 measure this dependence on external finance by computing the share of capital expenditures not financed using internal cash flows for large public U.S. firms. This industry-specific variable is referred to as the *external finance dependence* of the different industries. They argue that restricting attention to this subset of firms allows them to identify the industries' needs for external finance (as opposed to their access to it) since such firms are not likely to be financially constrained. Under the assumption that the rank of external finance needs across industries is relatively stable across countries, they then interpret their measure of external finance dependence as informative about the industries' rank across countries.[28]

We follow their approach by defining new exporters to be *more financially constrained* if they belong to an industry with external finance dependence greater than, or equal to, that of the industry at the θ_D percentile. Analogously, new exporters are defined to be *less financially constrained* if they belong to an industry with external finance dependence lower than the industry at the θ_D percentile. While the measure of external finance dependence is not available specifically for expenditures related to working capital needs, or international trade, we follow Manova (2013) and consider this measure as an appropriate proxy for these. Our model suggests, then, that firms decisions' in the industries with higher external finance dependence should be relatively more distorted by financial frictions.

[28] For further details on their approach, see Rajan and Zingales, 1998.

Model. As in the data, we classify firms in the model into two groups: "more financially constrained" and "less financially constrained". We define a firm to be *more financially constrained* if upon entry to the foreign market its *profit gap* (the ratio of its profits in the model with financing constraints relative to the profits it would make in an environment without financial frictions) is below a threshold $\theta_M \in [0, 1]$. Similarly, new exporters are defined to be *less financially constrained* if their profit gap upon entry to the foreign market is greater than or equal to θ_M.[29]

While this constitutes our main approach to identify more financially constrained and less financially constrained firms in the data, we investigate the sensitivity of our results to alternative definitions. We first study the robustness of our results to different values of θ_D. Second, we categorize firms according to the extent to which their industry requires large average inventory-holdings, which we consider to act as a drain in the financial position of firms. We report these additional findings in subsection 4.3.

4.2 New exporter dynamics: "more constrained" vs "less constrained" firms

Given the relatively low number of new exporters observed in the data, we choose $\theta_D = 0.50$, which results in a similar number of new exporters in each category. This implies that new exporters belonging to industries with external finance dependence below the industry median are classified as less constrained, while those in industries with external finance dependence above it are classified as more constrained. To keep the categories in the model comparable to those in the data, we choose θ_M to keep the number of new exporters in each of the categories approximately equal. To do so, we set $\theta_M = 0.94$, which means that new exporters with profits that are at least 6% lower than they would be in the absence of credit frictions are classified as more financially constrained, while the rest are classified as less financially unconstrained. Below, we compare the dynamics of less constrained and more constrained firms observed in the data with those implied by the baseline calibration of the financial frictions model.

Exports growth. We focus first on the growth of exports. Table 21 reports the export growth for the less financially constrained and the more financially constrained firms for both the data and the model. We see that in the data exports growth for constrained new exporters is on average higher than exports growth for unconstrained new exporters and this difference is particular large in the first period following the entry into the foreign market. A similar pattern is observed in the model, where more constrained exporters expand their foreign sales faster than less constrained exporters. Moreover, as observed in the data, our

[29] Notice that this definition classifies firms according to how financially constrained they are in the year in which they begin selling internationally, regardless of their situation in subsequent or preceding years. This, however, is consistent with our empirical approach since using industries to classify firms into "less constrained" and "more constrained" we undoubtedly included some firms that are little or not financially constrained in the latter and vice versa. Moreover, results are similar if we define firms to be financially constrained if their *average* profit gap over the whole simulation is below a given threshold, rather than just upon entry to the foreign market.

model predicts that the difference in the growth rates is the largest following the export entry. Thus, we conclude that the observed dynamics of export growth in the data are broadly consistent with the presence of financial frictions.

Table 21: Median exports growth

	Data		Model	
Years as an exporter	Less constrained	Constrained	Less constrained	Constrained
1				
2	0.16	0.30	0.07	0.31
3	0.06	0.00	0.08	0.16
4	0.03	0.11	0.06	0.08

The reason why more financially constrained firms have a higher growth rate is that, upon entry, these firms operate at a level far from their optimal scale and, as a result, have low profits. As they continue exporting, they accumulate assets, which allows them to relax their borrowing constraint leading to a rapid increase in their foreign sales. In contrast, firms that begin their export spells being less financially constrained already operate near their optimal scale. As a result, these firms adjust their foreign sales less rapidly percentagewise as they increase their internal assets.

Export hazard rate. Next, we analyze the dynamics of the export hazard rate among new exporters. The results are reported in Table 22.

In the data, export hazard rates are decreasing for both more financially constrained and less financially constrained exporters, but the hazard rate for the more constrained exporters is uniformly higher than the hazard rate for less constrained exporters. In the model, as in the data, the export hazard rate is decreasing for both groups of exporters, but it is only slightly higher for more constrained new exporters than for unconstrained ones. Thus, the behavior of hazard rate observed in the data is consistent with presence of financial frictions.

Table 22: Export hazard rate

	Data		Model	
Years as an exporter	Less constrained	Constrained	Less constrained	Constrained
1	0.23	0.29	0.30	0.31
2	0.13	0.23	0.22	0.23
3	0.09	0.17	0.17	0.17
4	0.04	0.10	0.15	0.15

Export intensity. We now study the dynamics of median exports intensity among cohorts of new exporters which export for at least four consecutive periods. These results are reported in Table 23.

In the data, we observe that while both constrained and unconstrained new exporters increase their export intensity in the years following export entry, the former export a uniformly lower share of their total sales. A similar pattern arises in the model. In particular, in the model both types of firms increase their export intensity over time, but the export intensity of more constrained firms is uniformly lower than the export intensity of less constrained firms. Thus, again we find that data is consistent with our hypothesis.

Table 23: Median export intensity

	Data		Model	
Years as an exporter	Less constrained	Constrained	Less constrained	Constrained
1	0.28	0.09	0.15	0.11
2	0.38	0.11	0.15	0.13
3	0.39	0.11	0.15	0.14
4	0.39	0.12	0.16	0.15

This pattern arises in the model because financially constrained new exporters have limited availability of internal and external finance to pay for their working capital needs. Since foreign sales have relatively higher working capital requirements, firms choose initially to export low fraction of their total sales. Moreover, the more constrained the firm is, the lower are its exports as a fraction of total sales. As firms continue to export, they accumulate internal funds, allowing them to relax their financial constraints and increase their export intensity.

Domestic sales growth. Finally, in Table 24 we report the dynamics of median domestic sales growth among cohorts of new exporters observed in the data and implied by our model. We see that in the data more constrained new exporters decrease their domestic sales by 6% upon entry to the foreign market while their unconstrained counterparts keep them constant. After the first period, both groups display similar domestic sales growth rates. Similar dynamics are observed in the model. As in the data, we find that more constrained new exporters grow at a considerably lower rate upon entry to the foreign market than their less constrained counterparts with both types growing at a similar pace afterward. However, in contrast to what we observe empirically, more financially constrained new exporters do not decrease their domestic sales upon export entry. Nevertheless, we conclude that the dynamics of domestic sales growth in the data are broadly consistent with the presence of financial frictions.

Our model predicts a drop in the domestic sales growth upon entry since firms that

Table 24: Median domestic sales growth

	Data		Model	
Years as an exporter	Less constrained	Constrained	Less constrained	Constrained
-1	0.13	0.08	0.14	0.38
1	0.00	-0.06	0.20	0.06
2	0.06	0.06	0.13	0.16
3	0.07	0.07	0.11	0.11
4	0.08	0.00	0.07	0.06

start to export being financially constrained face a tradeoff between selling domestically or internationally. Given their limited asset holdings, the sharp increase in exports upon entry to the foreign market limits the extent to which they can also expand their domestic sales. As a result we observe that more financially constrained new exporters face a significantly lower domestic sales growth than their less constrained counterparts. As financial constraints get subsequently relaxed, domestic sales growth in the subsequent periods is largely driven by the dynamics of productivity and is similar across the two groups.

4.3 Alternative empirical classifications

In this section we investigate whether the above empirical results are robust to two alternative ways of classifying firms into "less financially constrained" and "more financially constrained". First, as before, we categorize the firms according to their industry's external finance dependence. However, now we define a firm to be "more financially constrained" if it belongs to the industry with external finance dependence level above the 60^{th} percentile across industries, and to be "less financially constrained" if its industry's level of external finance dependence is below the 40^{th} percentile. Second, we consider a classification based on the industry's average level of inventory holdings. Since higher inventories translate into higher working capital needs, and, thus, into higher external finance dependence, we should expect that firms in industries with higher technological needs for inventories are more financially constrained.[30]

We construct a measure of the plant's inventory-intensities by adding up the inventories of finished goods as a share of total sales, and the inventories of materials as a share of total material expenditures. We compute the average industry-level inventory-intensities at the two-digit ISIC rev. 3 level, and find substantial differences across industries in their

[30] There are various reasons why firms in some industries have to hold larger inventories than in others. For instance, some industries may have sales relatively concentrated over a period of a few months, while others may have the same volume of sales more evenly spread out across the year. To the extent that this happens, the former are likely to hold larger inventory-holdings than the latter, since they need to build up inventories of their final goods to have sufficient stock available during the few busy months of sales. There may be alternative drivers of these cross-industry differences in inventory-holdings but, for the purposes of our paper, we remain agnostic about the particular nature of these differences.

average level of inventory-holdings. We then divide new exporters into two groups: those in industries with average levels of inventory holdings above the 30^{th} percentile are classified as constrained, and those below it are classified as unconstrained. We chose the cutoff point to ensure that both groups contain a similar number of firms.[31]

As we can observe in Table 25, the differences between constrained and unconstrained new exporters documented above in Tables 21-24 are robust to the alternative empirical classifications of plants. In particular, we observe that more constrained new exporters, compared to less constrained ones, have higher export growth rates, are more likely to stop exporting, have lower export intensity and feature lower domestic sales growth in the the pre-entry and the entry periods. The robustness of these empirical findings, and their consistency with our model, provides support for the hypothesis that financial frictions drive the dynamics of new exporters observed in the data

Table 25: Alternative empirical counterparts

	External finance dependence		Inventories	
Years as an exporter	Less constrained	More Constrained	Less constrained	More Constrained
		Median exports growth		
1				
2	0.13	0.32	0.25	0.30
3	0.10	0.02	0.07	-0.01
4	0.00	0.11	0.04	0.05
		Hazard rate		
1	0.24	0.29	0.21	0.30
2	0.16	0.23	0.13	0.23
3	0.10	0.19	0.07	0.20
4	0.09	0.10	0.04	0.11
		Median export intensity		
1	0.36	0.09	0.23	0.08
2	0.49	0.11	0.29	0.10
3	0.47	0.12	0.30	0.10
4	0.49	0.14	0.34	0.11
		Median domestic sales growth		
-1	0.13	0.07	0.13	0.08
1	0.00	-0.06	-0.02	-0.06
2	0.10	0.05	0.06	0.07
3	0.07	0.07	0.11	0.04
4	0.08	0.00	0.07	-0.02

[31] For further details on the construction of the data and these variables, see subsection 5.1of this appendix.

5 Asymmetric working capital requirements

We now provide empirical evidence in support of our assumption that foreign sales require higher working capital. We investigate two dimensions that are informative about the relative differences in working capital needs. First, we show that exporters hold relatively higher levels of inventories than non-exporters. Second, we show that exporters are more likely to be paid after delivery than non-exporters. As we argue below, both of these measures suggest higher working capital needs associated with export sales compared to domestic sales.

5.1 Inventories

We begin by showing that exporters have higher inventory-holdings than non-exporters in the Chilean plant-level dataset used throughout the paper. This suggests that exporters are likely to need relatively more working capital to finance the additional inventory investments resulting from exports activities.

Approach. We study the inventory-holdings of exporters relative to non-exporters following the approach pursued by Alessandria et al. (2010) to measure the differential use of inventories by importers.[32] For each plant j in the data, we observe its inventory holdings of materials and finished goods both at the start and at the end of the survey period. We thus use the average inventory-holdings between the start and the end of the period as our preferred measure of a plant's inventories. To make the intensity of inventory use comparable across plants, we normalize inventory holdings by the annual use of the respective goods. For materials, inventories are measured as a share of annual purchases of materials i^m_{jt}. For finished goods, inventories are expressed as a share of annual sales i^f_{jt}. Finally, we define total inventories as $i_{jt} = i^m_{jt} + i^f_{jt}$.

We trim the largest 1% of the observations in both i^m_{jt} and i^f_{jt} to control for outliers. The dataset that we use is, otherwise, identical to the one used in the paper.[33]

Evidence: Chilean Data. In Table 26 we report the average inventory-holdings of exporters and non-exporters for each of the inventory measures described above. We find that exporters hold inventories of finished goods that are worth, on average, 7% of their annual sales, almost twice as much as final goods inventory holdings of non-exporters. Under the assumption that sales are evenly spread over the year, this translates into inventory-holdings equal to 3.5 weeks of sales in the case exporters and only 2 weeks in the case of non-exporters. Similarly, we find that exporters hold more inventories of material inputs than non-exporters: 27% and 21%, respectively. If production were evenly spread over time

[32] Exporters might need to accumulate larger inventories of finished goods before export shipments are made as an optimal response to the higher lumpiness of export transactions. Alternatively, it is possible that foreign orders are more volatile than domestic ones so that exporters find it optimal to hold larger inventories of finished goods and production inputs to be ready to meet these unanticipated large orders. For the purposes of our analysis we remain agnostic about the particular reasons that may lead exporters to hold larger inventories.

[33] For further details, see Section 2.1 in the paper.

this would translates into a difference of three full weeks of production inputs between exporters and non-exporters. Finally, we also find that our measure of total inventories is also larger for exporters.

Table 26: Average inventory-holdings

	Total Inventory	Materials inventory	Finished goods inventory
Non-exporters	0.25	0.21	0.04
Exporters	0.34	0.27	0.07

Table 27: Regression of inventory-holdings on exporter dummy

Exporter dummy	Inventory	Materials inventory	Finished goods inventory
No controls	0.09***	0.06***	0.03***
Fixed effects	0.10***	0.06***	0.03***
Fixed effects and total sales	0.13***	0.10***	0.04***

Note: ***, **, and * denote coefficients are statistically significant at the 1%, 5%, and 10% levels, respectively.

While Table 26 suggests that there are large differences in inventory-holdings between exporters and non-exporters these differences could be driven by other sources of heterogeneity between plants that export and those which do not. To address this issue we regress our three measures of inventory-holdings on an exporter dummy, a set of fixed effects (industry-year fixed effects and region fixed effects), and the plants' total sales in logs. In each case we find that exporter dummy is statistically significant at the 1% level (see Table 27). Thus, we conclude that exporting is associated with higher inventory holdings.

Further evidence: WBES dataset. We also use the World Bank Enterprise Survey to provide cross-country evidence supporting our assumption of asymmetric working capital needs associated with domestic and foreign sales.[34] In contrast to the Chilean plant-level data, in this dataset we only observe the inventory-holdings of the "most important input" used in the production process. Inventories of this input are measured in "days of production", the numbers of days that the production process could be normally sustained given the amount of this input available in stock.

In Table 28, we report the average inventory-holdings of the most important input of production for exporters and non-exporters in Chile as well as for all countries in the survey. Consistent with the evidence documented in the plant-level Chilean dataset, we find that exporters hold considerably larger inventories of production inputs than non-exporters. In Chile, exporters hold inventories which can support production for almost 56 days, while

[34] For a more detailed description of the data and methodology, see Enterprise Surves (`http://www.enterprisesurveys.org`), The World Bank.

non-exporters only hold inventories that can last for 39 days. This pattern is also observed across all countries in the survey: exporters hold average inventories of their most important production input to last for 36 days of production, while the inventories of non-exporters are only enough to last for 27 days.

Table 28: Average inventory-holdings

Inventory of production inputs (# of days of production)	Chile	All countries
Non-exporters	38.7	26.5
Exporters	55.6	35.8

These differences in inventory holdings are unlikely to be driven by systematic firm-level differences between exporters and non-exporters. As the results in Table 29 show, a regression of inventory-holdings (in logs) on an exporter dummy implies a statistically and economically significant difference between exporters and non-exporters in Chile and all surveyed countries, controlling for country, year, and industry fixed effects, as well as for the log of firm-level total sales.

Table 29: Regression of inventory-holdings (log) on exporter dummy

Exporter dummy	Chile	All countries
No controls	0.68***	0.44***
Fixed effects	0.68***	0.25***
Fixed effects and total sales	0.23*	0.15**

Note: ***, **, and * denote coefficients are statistically significant at the 1%, 5%, and 10% levels, respectively.

5.2 Payment contract

Next, we study whether exporters are more likely to be paid after goods are delivered than non-exporters. Insofar as this is the case, exporters are likely to face larger time lags from the moment that production inputs are paid for their services and goods are produced, and the moment that revenues from sales of these goods are received. This would further suggest that exporters are likely to need more internal funds or access to external finance, to afford the production costs before their returns accrue.

We study the relationship between the payment contracts and export status by using the data from the World Bank Enterprise Survey. Firms in this dataset are asked to report the share of their total annual sales that were: (*i*) paid for before the delivery, (*ii*) paid for on delivery, and (*iii*) paid for after delivery. In Table 30, we report the average share of revenues received after delivery for exporters and non-exporters in Chile and all countries surveyed. We see that Chilean exporters typically receive 84% of their revenues after goods are delivered, while this figure is only 57% for non-exporters. Similarly, exporters typically receive 65% of their sales after delivery across all countries in the survey, with non-exporter being paid for 54% of these after delivering the goods sold.

Table 30: Average share of revenues received after delivery

	Chile	All countries
Non-exporters	0.57	0.54
Exporters	0.84	0.65

Whether payments are made after delivery may not only depend on a firm's export status, but also on the industry in which it operates and other idiosyncratic features of the firm and its country. To address these concerns, in Table 31 we report the estimated export dummy from a regression on the share of revenues received after delivery, controlling for country, industry, and year fixed effects, as well as for the firm's total sales (in logs). We find statistically and economically significant differences between exporters and non-exporters, which imply that the share of sales paid after delivery for Chilean exporters is 16 percentage points higher than for non-exporters. In contrast, we find no statistically significant differences between exporters and non-exporters across all countries in the survey once we control for the log of total sales.

Table 31: Regression of share of revenues received after delivery on exporter dummy

Exporter dummy	Chile	All countries
No controls	0.26***	0.12***
Fixed effects	0.18***	0.04***
Fixed effects and total sales	0.16**	0.02

Note: ***, **, and * denote coefficients are statistically significant at the 1%, 5%, and 10% levels, respectively.

5.3 Working capital intensity: model vs data

We now compare the relative working capital intensity of exporters and non-exporters implied by our calibrated model with the relative working capital intensity observed in the data. In the model, we measure firms' working capital intensity by computing the ratio of total working capital needs $\alpha wn + e' [wF + wn^*]$ to total sales, and define the working capital intensity of exporters relative to non-exporters as the ratio between the average working capital intensity of exporters and that of non-exporters. With $\alpha < 1$ and $F > 0$ our model implies that exporting is associated with higher working capital needs than domestic production. Indeed, we find that under our baseline calibration the relative working intensity of exporters to non-exporters is equal to 1.3.

We then compute working capital intensity of exporters relative to non-exporters using the various statistics studied earlier in this section. First, we compute the average inventory-holding intensity of exporters relative to that of non-exporters for our three measures of inventory-holdings: (*i*) total inventory, (*ii*) finished goods inventory, and (*iii*) materials inventory. We find that the working capital intensity ratio implied by these measures vary from 1.29 for material inventories to 1.75 for finished goods inventories (Table 32). Next, we investigate the magnitude of the relative working capital intensity of exporters using statistics obtained from the World Bank Enterprise Survey documented in Table 28 and Table 30. Using inventory of production inputs and revenue lags, we find that working capital needs are more than 1.4 times higher for exporters than non-exporters.

Table 32 reports the working capital intensity of exporters relative to non-exporters implied by the model and the values implied by different empirical measures computed above. We see that the degree of asymmetry in working capital needs implied by the model is well within the range observed in the data. Thus, we conclude that the high working capital requirement for foreign sales implied by our calibration is consistent with empirical measures of asymmetric needs for working capital across exporters and non-exporters.

Table 32: Working capital intensity: Model vs. data

	Working capital intensity (Avg. exporters / Avg. non-exporters)
Model	1.30
Chilean Census of Manufactures	
Inventory	1.36
Finished goods inventory	1.75
Materials inventory	1.29
Chilean data from World Bank Enterprise Survey	
Inventory of production inputs	1.44
Share of revenues after delivery	1.47

6 Plant-level growth and export transitions

To further examine the extent to which our model can account for features of the data not targeted in the calibration, we now investigate whether our model can account for the relationship between export transitions and plant-level growth rates as it has been previously documented by Bernard and Jensen, 1999.

We begin by partitioning plants into groups based on their export status at two given points in time: period t and period $t+k$. Firms that do not export in period t but export in period $t+k$ are classified as *starters*. Firms that export in period t but do not do so in period $t+k$ are classified as *stoppers*. Finally, those that export in both periods are classified as *exporters*, while those that do not export in either period are referred to as *non-exporters*. We compute the median annual sales growth for firms in each of these groups,[35] for $k = 1, 4, 8$.

Table 33: Median annual sales growth

	Data			Financial Frictions			Sunk costs		
	1 yr	4 yrs	8 yrs	1 yr	4 yrs	8 yrs	1 yr	4 yrs	8 yrs
Starter	0.08	0.09	0.09	0.25	0.22	0.23	2.14	0.72	0.51
Stopper	0.02	0.01	0.02	-0.45	-0.16	-0.09	-0.68	-0.20	-0.10
Cont. exporter	0.05	0.06	0.07	0.05	0.00	0.00	-0.13	-0.06	-0.02
Cont. non-exporter	0.02	0.02	0.02	0.06	0.02	0.01	0.07	0.02	0.01

The results are reported in Table 33. We find the following order for every k considered: starters grow relatively faster than continuing exporters, which grow faster than non-exporters. Stoppers grow at the slowest pace.

The financial frictions model implies a similar relationship between export transitions and plant-level growth, except that continuing non-exporters are likely to grow at a faster rate than exporters.[36] While the sunk cost model also implies a similar ordering of growth rates among groups, this model is largely at odds with the data in respect to the magnitudes: starters grow at a considerably higher rate than starters in the data, stoppers shrink at much faster rate than stoppers in the data (even more than the financial frictions model); moreover, continuing exporters actually shrink, instead of experiencing low positive growth as in the data.

We quantify the difference between these moments and their empirical counterparts by computing the mean absolute deviation between these for each of the models. We find that the mean absolute deviation between the moments implied by the sunk cost model and those observed in the data (0.39) is more than three times as large as the mean absolute deviation corresponding to the financial frictions model (0.12).

[35] That is, we compute the annual growth rate of sales y_t between period t and period $t+k$ as: $\frac{1}{k}\frac{y_{t+k}-y_t}{y_t}$.

[36] Quantitatively, however, stoppers feature positive growth in the data, while they shrink in the model.

7 Time aggregation

In documenting the dynamics of new exporters throughout the paper, we compute the growth of exports and export intensity during the export spell of a firm. Consistent with our model, we interpret this growth as driven by an increase in the scale of the firm, and its desire to increase its foreign sales. One concern, however, is that total exports and export intensity are downward biased in the first year of exporting due to time aggregation: our measures may not reflect the actual growth of exports *per unit of time* during the period in which firms sold internationally. In particular, while we may observe a very large growth of exports or export intensity between the first and second year of an export spell, this may simply reflect that firms which enter the export market in a given year typically sell internationally for only a smaller fraction of the year than firms in their second year of an export spell, just because they were not exporters during the whole year.

Our goal in this section is to study the extent to which the dynamics of exports growth and export intensity documented in the paper are sensitive to this potential time aggregation issue. To do so, we augment the observations corresponding to plants in their first year in the export market by a multiple $\eta > 1$, to take into account that some growth in exports between the first and second years is merely driven by the time aggregation issue described above. Under a specific set of assumptions, we derive an expression for η, which depends on moments of (*i*) the distribution of firms' decision to start exporting across the months of the year, and (*ii*) the distribution of firms' export sales across the months of the year. We estimate these moments using Chilean transaction-level data for manufacturing firms for the period 2003-2007, and use them to compute η. Then, with an estimated value for η, we adjust the data accordingly and contrast the series that control for time aggregation with the data series reported in the paper.

7.1 Deriving an expression for η

Let a year be divided into N *subperiods*. To find an expression for η, we make three assumptions. First, we assume that the distribution of exporters' decision to start exporting is uniform across subperiods. Second, we assume that a share β of firms export in only one subperiod, while a share $1-\beta$ exports in all subperiods after export entry. Finally, we assume that sales are distributed uniformly across subperiods in which exporters have positive exports.

Now, let $\widetilde{x}$ denote the level of exports *observed* during firms' first year of foreign sales, and let x denote the total foreign sales that the firm would have made *had it exported* in all subperiods of the year.[37] The latter is the object that we are after, and which constitutes our time-aggregation-adjusted measure of a firm's exports in their first year of foreign sales. Given that we observe a large number of firms but cannot observe the time of the year in which they began to export, we apply the assumptions made earlier along with the law of

[37] Note that x is not observed in the data, and constitutes a theoretical construct that we use to measure the amount that firms would have exported had they started to export earlier.

large numbers to derive the relationship between $\widetilde{x}$ and x.

We restrict attention to the case in which $N = 2$, so that they year is split into two halves. First, note that, with probability 1/2 the firm chose to begin exporting in the first period, in which case it exported x, and the value we observe is not biased by time aggregation. However, with probability 1/2, the firm actually chose to begin exporting in the second period. In that case, there are two possibilities: either the firm is of the type that exports only in one subperiod (which happens with probability β) or the firm is of the type that exports in all subperiods (probability $1 - \beta$). In the former case, we have that the firm exported x, since it would have not exported more than that had it began exporting earlier. In contrast, in the latter case, the observed value of exports is half as large as it would have been in the case in which the firm began to export earlier: that is, we observe $\frac{x}{2}$ instead of x. Therefore, when $N = 2$, the relationship between $\widetilde{x}$ and x is given by:

$$\widetilde{x} = \left\{ \frac{1}{2} + \frac{1}{2} \left[\beta + \frac{(1-\beta)}{2} \right] \right\} x$$

Rearranging, we have $x = \eta \widetilde{x}$, where the adjustment coefficient η is given by:[38]

$$\eta = \frac{1}{\left[1 - \frac{1}{4}(1-\beta) \right]} > 1$$

Note that we assume that firms' export entry decision is independent of the exporting possibilities available earlier in the year. This assumption will lead to an upper bound of the time aggregation adjustment, since it implies that firms would have exported more had they entered the foreign market earlier.

7.2 Estimating η

Our expression for η depends on two parameters: β and N. We estimate the share β of firms that only export in one subperiod using transaction-level data collected by Chilean Customs over the period 2003-2007. We restrict attention to manufacturing firms. We then use this dataset to check that the distributional assumptions made to compute the adjustment approximate the empirical distributions.

To estimate a value for β, we look at the distribution of periods with positive exports over the year. With $N = 2$, firms may either have positive exports in both halves of the

[38] More generally, for an arbitrary value of $N > 1$, it is straightforward to show that:

$$\widetilde{x} = \left\{ \frac{1}{N} + \frac{1}{N} \sum_{n=1}^{N} \left[\beta + (1-\beta) \frac{N-n}{N} \right] \right\} x = \left[1 - (1-\beta) \frac{1}{2} \frac{N-1}{N} \right] x$$

in which case,

$$\eta = \frac{1}{\left[1 - (1-\beta) \frac{1}{2} \frac{N-1}{N} \right]} > 1$$

year, or only in one of them. In Table 34 we report this distribution for the set of all firms observed in the data, for those in their first year as an exporter, and for those in their second year.

Among firms in their first year as exporters, we observe that 72% of them sold in only one of the halves of the year. Some of these firms may have been able to sell all year round but chose not to do so, and others may have only began exporting towards the end of the year. In contrast, in the second year, approximately 45% of firms sold in both halves of the year, when all of them could have done so given that they had already exported the year before. Similarly, when all exporters are pooled together, we find that less than half of them sell all year round, which suggests that most of the firms would choose not to export all year round even if given the chance to do so.

Then, given that β denotes the share of firms that export for only half of the year, we set it to 0.55 in order to match the share of firms that do so among second-year exporters.[39] This means that $1 - \beta$ of the firms would have exported more had they started to export earlier. Therefore, with $N = 2$ and $\beta = 0.55$, we have have that $\eta = 1.13$.

Table 34: Distribution of periods with positive exports over the year

	Exporters		
Period	All	First-year	Second-year
Half-year	0.52	0.72	0.55
All year	0.48	0.28	0.45

7.3 Distributional assumptions

We now examine the extent to which the distributional assumptions made to derive η are consistent with the transaction-level data for Chile.

Distribution of export entry over the year. In Table 35, we report the distribution of export entry over the course of the year. As it can be observed, we find that the share of firms that begin to export in the first half of the year is very similar to the share that begin to do so in the second half of the year. This evidence provides support for the assumption that the distribution of exporters' entry is uniform across subperiods.

Table 35: Distribution of export entry over the year

Period	Share of new exporters
First half	0.47
Second half	0.53

[39] We focus on second year exporters since these firms are more likely to exhibit a pattern of exports similar to first-year exporters, but the results are not sensitive to this choice.

Distribution of export sales across periods exported. In Table 36, we report the distribution of export sales across the number of subperiods exported. To do so, we compute the median ratio of sales (in logs) for each of the firms that export in both halves of the year. Then, a median ratio equal zero would denote an equal distribution of sales across the year.[40] We find that for first-year exporters sales in the second half of the year are approximately 45% higher than their sales in the first half. However, across all exporters as well as across all second-year exporters, sales in each half of the year are very similar: sales are higher in the second half by 13% and 15%, respectively. This evidence provides the support for the assumption that the distribution of exporters' sales is uniform across both halves of the year, once we condition on firms that can actually export from the start of the calendar year.

Table 36: Distribution of export sales across periods exported

	Median log second half / first half		
Periods	All	First-year	Second-year
Two-subperiod exporters	0.13	0.45	0.15

7.4 Adjusted data series

We now adjust the dynamics of new exporters corresponding to exports growth and export intensity to account for potential time aggregation bias, and contrast them with the evidence documented in the paper.[41] The results are reported in Table 37 and Table 38. As it can be observed, the time aggregation adjustment decreases the rate of exports growth of plants that have just began to export. Similarly, the time aggregation adjustment increases the export intensity of plants in their first period as exporters. While these adjustments have some quantitative impact on the series reported, the qualitative patterns remain unchanged.

Table 37: Median exports growth

Years as an exporter	Raw data	Time aggregation adjustment
1		
2	0.30	0.17
3	0.04	0.04
4	0.05	0.05

[40] Values above zero imply higher sales in the second half, while values below zero imply higher sales in the first half.

[41] Given that we restrict attention to firms that export for at least four consecutive periods, the last observation reported might also be subject to a potential time aggregation bias. However, only 7% of the firms reported stop exporting between the 4th and 5th periods, and then the adjustment would be negligible.

Table 38: Median export intensity

Years as an exporter	Raw data	Time aggregation adjustment
1	0.13	0.14
2	0.17	0.17
3	0.18	0.18
4	0.20	0.20

8 Alternative Calibrations

In this section we investigate the sensitivity of our findings to alternative approaches for calibrating the financial frictions and sunk cost models.

We begin by examining the role played on our findings by the assumption that working capital requirements are asymmetric between exports and production for the domestic market. To do so, we consider a parameterization that forces the working capital requirements of exports and domestic production to be symmetric, and recalibrates all other parameters to match the target moments.

We then examine the potential of our model in accounting for the growth of export intensity, which is not fully accounted for in our baseline calibration. To do so, we recalibrate our model by adding the median growth of export intensity as an additional target moment.

Finally, we examine the extent to which our findings depend on the fact that we target the median export intensity instead of targeting a measure that better captures the full distribution of export intensities featured by our model, such as the aggregate ratio of exports to total sales. To do so, we recalibrate the financial frictions and sunk cost models to match the aggregate ratio of exports to total sales instead of the median export intensity.

8.1 Symmetric working capital constraints

In the paper we introduce an asymmetry in the working capital requirements of exports and sales for the domestic market. We provide empirical evidence in support of this feature of the model, and we argue that it is only needed to capture the increase in export intensity observed in the data. In this section we show that the latter statement is indeed the case. To do so, we calibrate the model without this asymmetry (i.e. $\alpha = 1$), and show that most of the results still hold, except for export intensity which is now constant.

8.1.1 Calibration

We choose the parameters of the model following the same calibration strategy as in the paper, except that we set $\alpha = 1$, and instead add λ as an additional parameter chosen to match the target moments. We follow an SMM approach to find the parameters that minimize a distance function between the target moments and the simulated moments.[42]

Note that with $\alpha = 1$ the calibrated value of λ is lower than in the benchmark calibration (1.32 versus 1.64) while the calibrated discount rate, β, is higher (0.91 versus 0.83). A higher α increases the amount of working capital required to produce a given amount of output for the domestic market. This implies that firms are more likely to be financially constrained, since they now require a larger amount of external finance. Moreover, the value of λ in this calibration is actually lower than in the one reported in the paper in order to match the extent of external finance dependence, leading to a further tightening of their financial constraint. This is because a lower lambda lowers the amount that firms can borrow externally.

[42] For more details on the calibration strategy, see subsection 5.1 in the paper.

Table 39: Calibration

	Financial frictions
γ	2
σ	5
α	1
β	0.91
F	1.71
S	-
η	0.16
κ	0.13
τ	1.51
ρ	0.92
σ_{ε}	0.10
λ	1.32

With a higher value of α and a lower value of λ, firms are likely to be more financially constrained, conditional on a given level of assets. This increase in the extent of financially constrained firms decreases the rate of entry to the export market. Therefore, this calibration requires a higher value of β in order to match the implied export entry rate with the one observed in the data.

Table 39 presents the calibrated parameters, and Table 40 shows that the financial frictions model can match the target moments relatively well under this alternative calibration strategy. Notice that α and λ are not calibrated in the sunk cost model and, thus, such model does not need to be recalibrated under the alternative assumption we use in this subsection.

Table 40: Target moments

	Data	Financial frictions
Export entry rate	0.03	0.03
Export exit rate	0.11	0.10
Median exports/sales	0.16	0.16
Median exporter size premium	4.81	4.58
External finance/sales	0.12	0.12
	Size distribution of exporters by total sales	
$\Phi^X_{(0,25)}$	0.03	0.03
$\Phi^X_{(50,75)}$	0.24	0.18
$\Phi^X_{(75,100)}$	0.66	0.63

8.1.2 New exporter dynamics

In this subsection we show that the financial frictions model with symmetric working capital requirements can replicate the dynamics of new exporters observed data, except for the growth of export intensity which remains constant. These dynamics are illustrated in Figures 12-14. In Figures 15-17, we show that this calibration of the model is also consistent with additional features of the data, providing support for our mechanism as the driver of new exporter dynamics.

Figure 12: Export exit rate

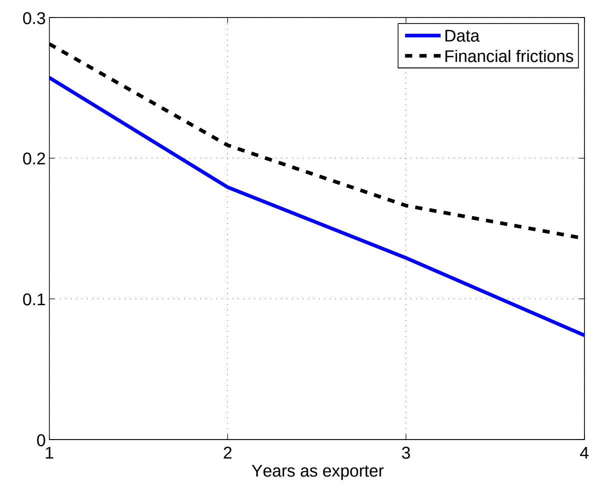


Figure 13: Export sales growth

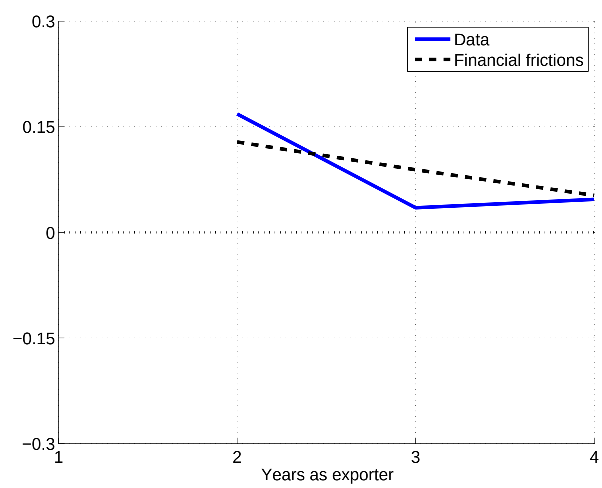


Figure 14: Export intensity

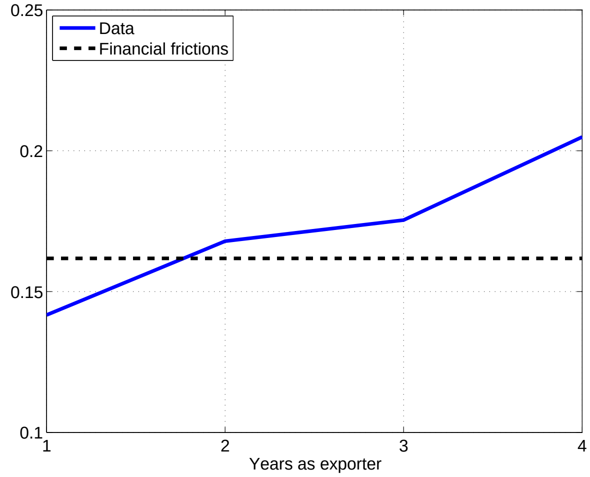


Figure 15: Domestic sales growth

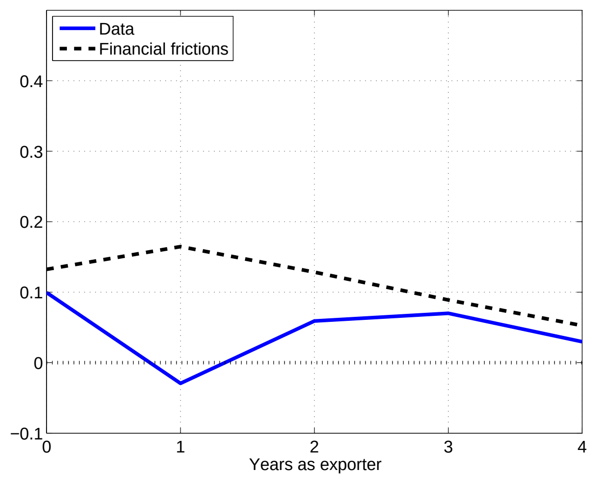


Figure 16: External finance dynamics

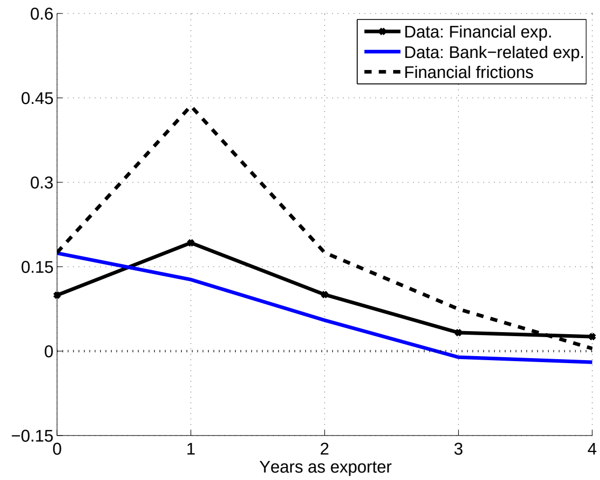
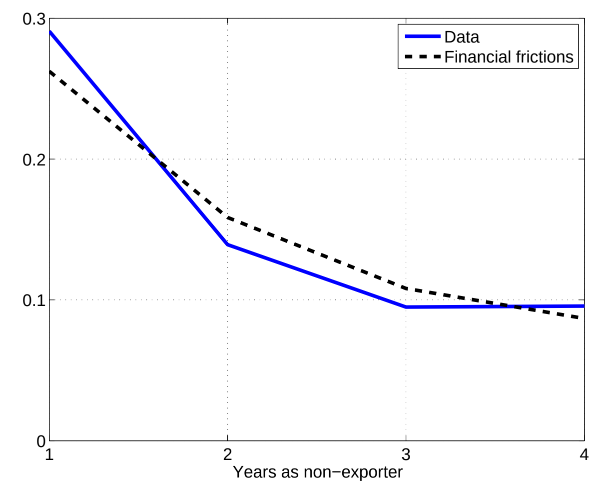


Figure 17: Non-exporters re-entry rate



8.2 Matching median export intensity growth

In this section we consider an alternative calibration strategy where, in addition to the moments targeted in the baseline calibration in the paper, we also target the median growth of export intensity observed in the data.

8.2.1 Calibration

We choose the parameters of the model following the same calibration strategy as in the paper, except that we additionally target the median growth of export intensity, and thus have one more moment than parameters. We compute the median growth of export intensity as the difference between median export intensity among firms in their fourth year of exporting and median export intensity of these firms upon entry to the export market. We follow an SMM approach to choose the parameters that minimize a distance function between the target moments and the simulated moments.[43]

Table 41: Calibration

	Financial frictions
γ	2
σ	5
λ	1.64
β	0.63
F	1.44
S	-
η	0.17
κ	0.11
τ	1.32
ρ	0.91
σ_{ε}	0.12
α	0.34

Table 41 presents the chosen parameters, and Table 42 shows the fit of the model. Notice that the sunk cost model cannot generate any growth in export intensity and, thus, the calibration for this model remains the same as in the paper.

The financial frictions model can now match the median export intensity growth observed in the data, but at the expense of over-estimating the median export intensity, and under-

[43] For more details on the calibration strategy, see subsection 5.1 in the paper.

estimating the external finance over sales ratio. Given that α is now lower, β has to decrease to obtain a similar external finance, while τ has to decrease to match entry rate to the export market. This is because firms are now more constrained, so a lower iceberg cost is required to get the same share of new exporters as before. Finally, a lower τ implies a higher median export intensity.

If we instead calibrated λ jointly with the remaining parameters, the financial frictions model could match the target moments almost perfectly: a slightly higher λ allows the model to match the aggregate amount of external finance and to increase the iceberg cost τ by the amount required to match the share of new exporters. As mentioned above, a higher τ implies a lower median export intensity. The results for the calibration where we additionally allow λ to vary are available upon request.

Table 42: Target moments

	Data	Financial frictions
Export entry rate	0.03	0.03
Export exit rate	0.11	0.11
Median exports/sales	0.16	0.18
Median exporter size premium	4.81	4.84
External finance/sales	0.12	0.11
Median exports/sales growth	0.06	0.06
	Size distribution of exporters by total sales	
$\Phi^X_{(0,25)}$	0.03	0.03
$\Phi^X_{(50,75)}$	0.24	0.19
$\Phi^X_{(75,100)}$	0.66	0.67

8.2.2 New exporter dynamics

In this subsection we show that the financial frictions model can replicate the dynamics of new exporters observed data under this alternative calibration strategy, while matching a 100% of the growth in median export intensity. These dynamics are illustrated in Figures 18-20. In Figures 21-23, we show that this calibration of the model is also consistent with additional features of the data, providing support for our mechanism as the driver of new exporter dynamics.

Figure 18: Export exit rate

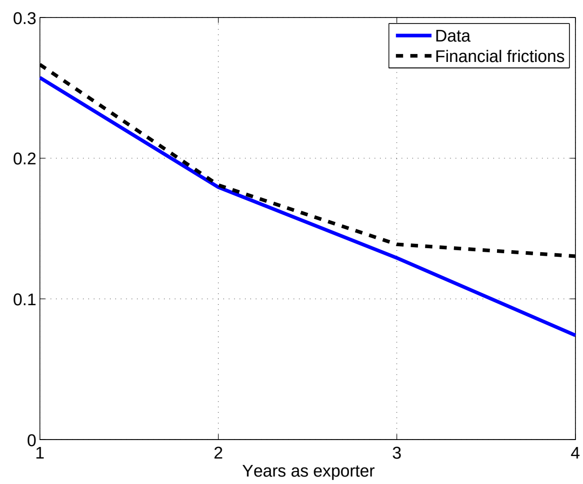


Figure 19: Export sales growth

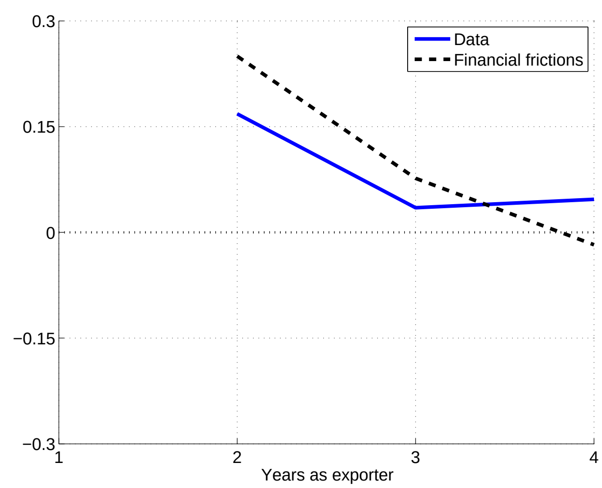


Figure 20: Export intensity

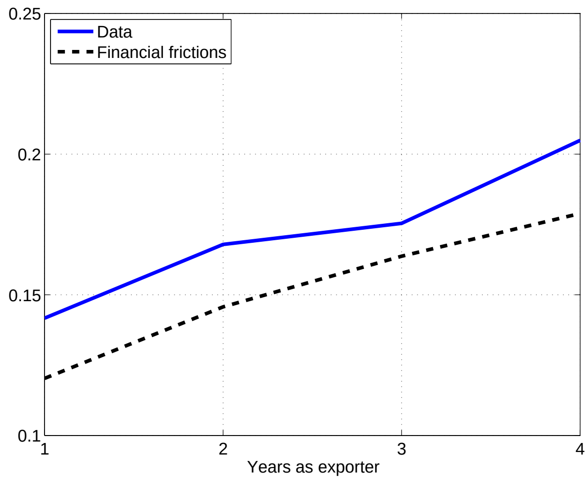


Figure 21: Domestic sales growth

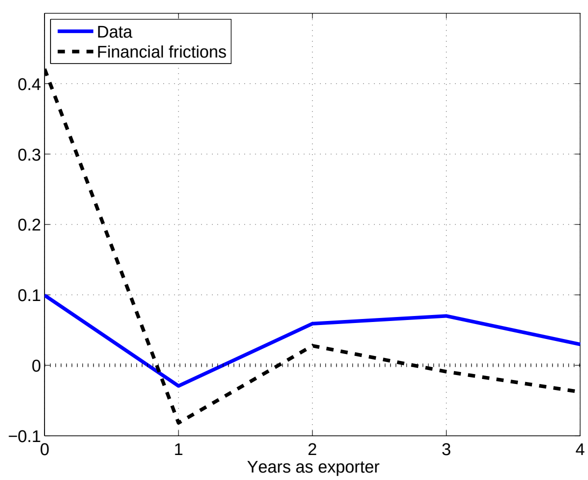


Figure 22: External finance dynamics

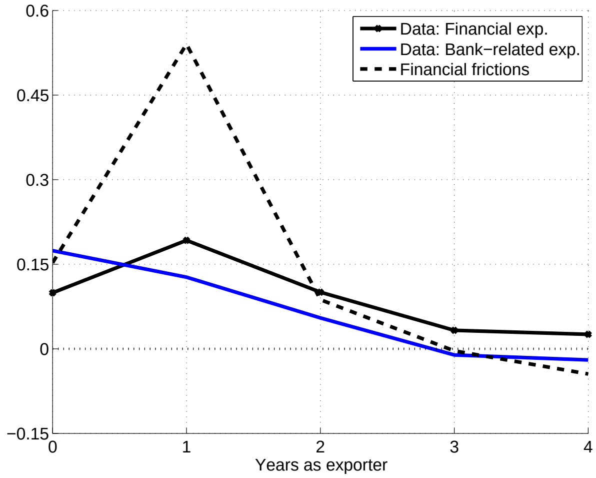
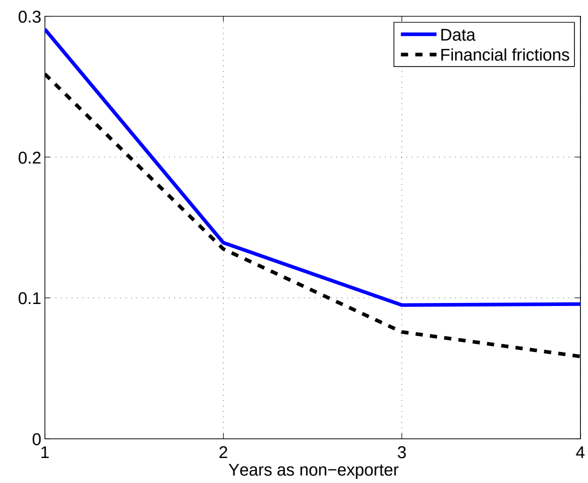


Figure 23: Non-exporters re-entry rate



8.3 Matching aggregate export intensity

In this section we calibrate both the financial frictions and sunk costs model to match aggregate ratio of exports to total sales, the aggregate export intensity, instead of the median export intensity, in addition to the remaining moments targeted in the baseline calibration followed in the paper.

8.3.1 Calibration

We choose the parameters of the model following the same calibration strategy as in the paper, except that we target the aggregate export intensity instead of the median export intensity. We follow an SMM approach to find the parameters that minimize a distance function between the target moments and the simulated moments.[44]

Table 43: Calibration

	Financial frictions	Sunk costs
γ	2	2
σ	5	5
λ	1.64	-
β	0.84	0.97
F	3.48	4.97
S	-	5.94
η	0.11	0.09
κ	0.16	0.10
τ	1.10	1.06
ρ	0.90	0.81
σ_ε	0.09	0.11
α	0.34	-

Table 43 presents the chosen parameters, and Table 44 shows the ability of the model to match the targeted moments.

[44] For more details on the calibration strategy, see subsection 5.1 in the paper.

Table 44: Target moments

	Data	Financial frictions	Sunk costs
Export entry rate	0.03	0.03	0.03
Export exit rate	0.11	0.09	0.11
Agg. exports/sales	0.25	0.23	0.24
Median exporter size premium	4.81	4.63	4.92
External finance/sales	0.12	0.12	0.12
	Size distribution of exporters by total sales		
$\Phi^X_{(0,25)}$	0.03	0.02	0.03
$\Phi^X_{(50,75)}$	0.24	0.14	0.11
$\Phi^X_{(75,100)}$	0.66	0.77	0.81

8.3.2 New exporter dynamics

In this subsection we show that the financial frictions model can replicate the new exporter dynamics in the data under this alternative calibration strategy, while the sunk cost model cannot. In particular, we find that the findings of the paper are not affected by this alternative calibration strategy. The dynamics of new exporters are illustrated in Figures 24-26. In Figures 27-29, we show that this calibration of our model is also consistent with additional features of the data, providing support for our mechanism as the driver of new exporter dynamics.

Figure 24: Export exit rate

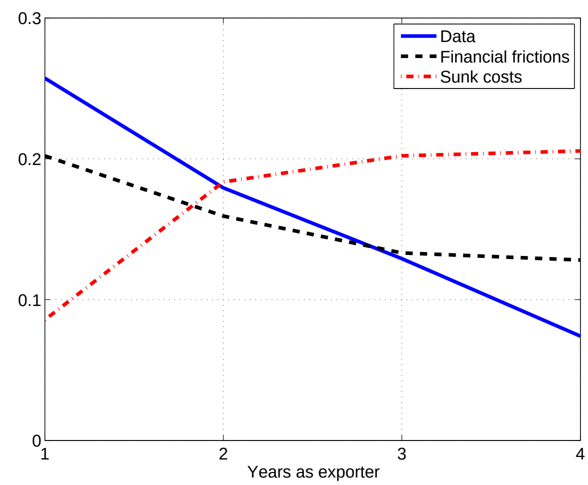


Figure 25: Export sales growth

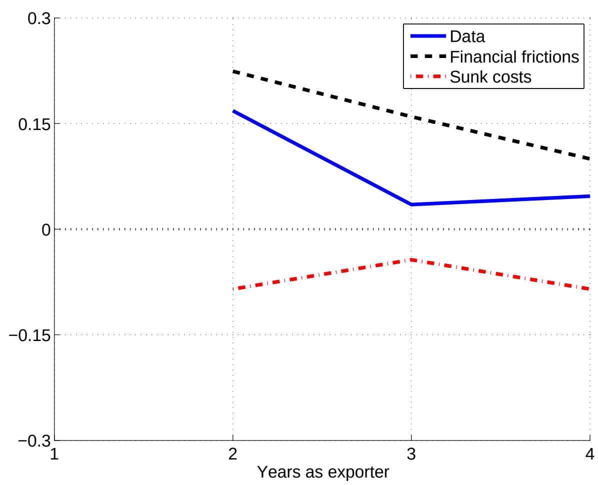


Figure 26: Export intensity

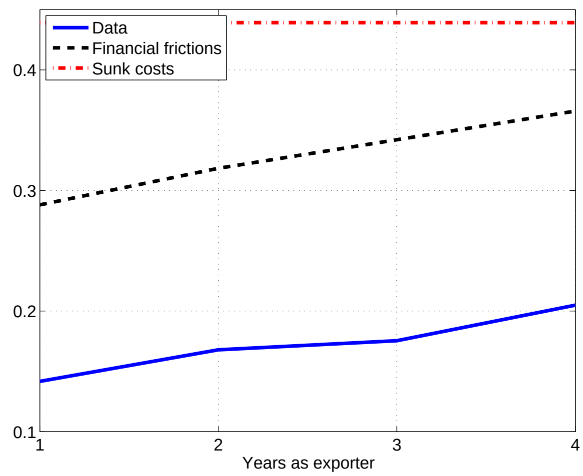


Figure 27: Domestic sales growth

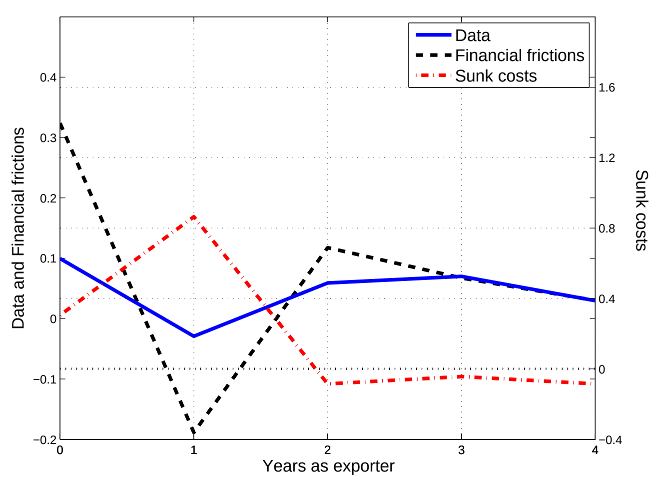


Figure 28: External finance dynamics

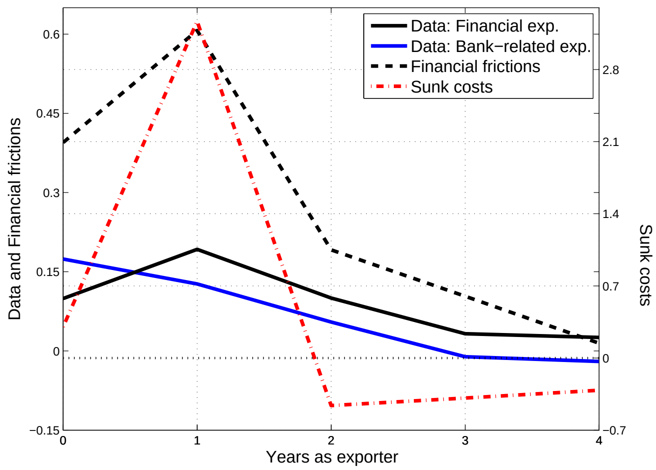
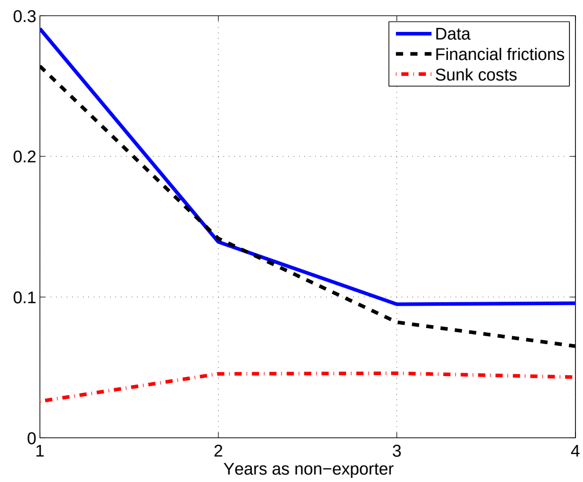


Figure 29: Non-exporters re-entry rate



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